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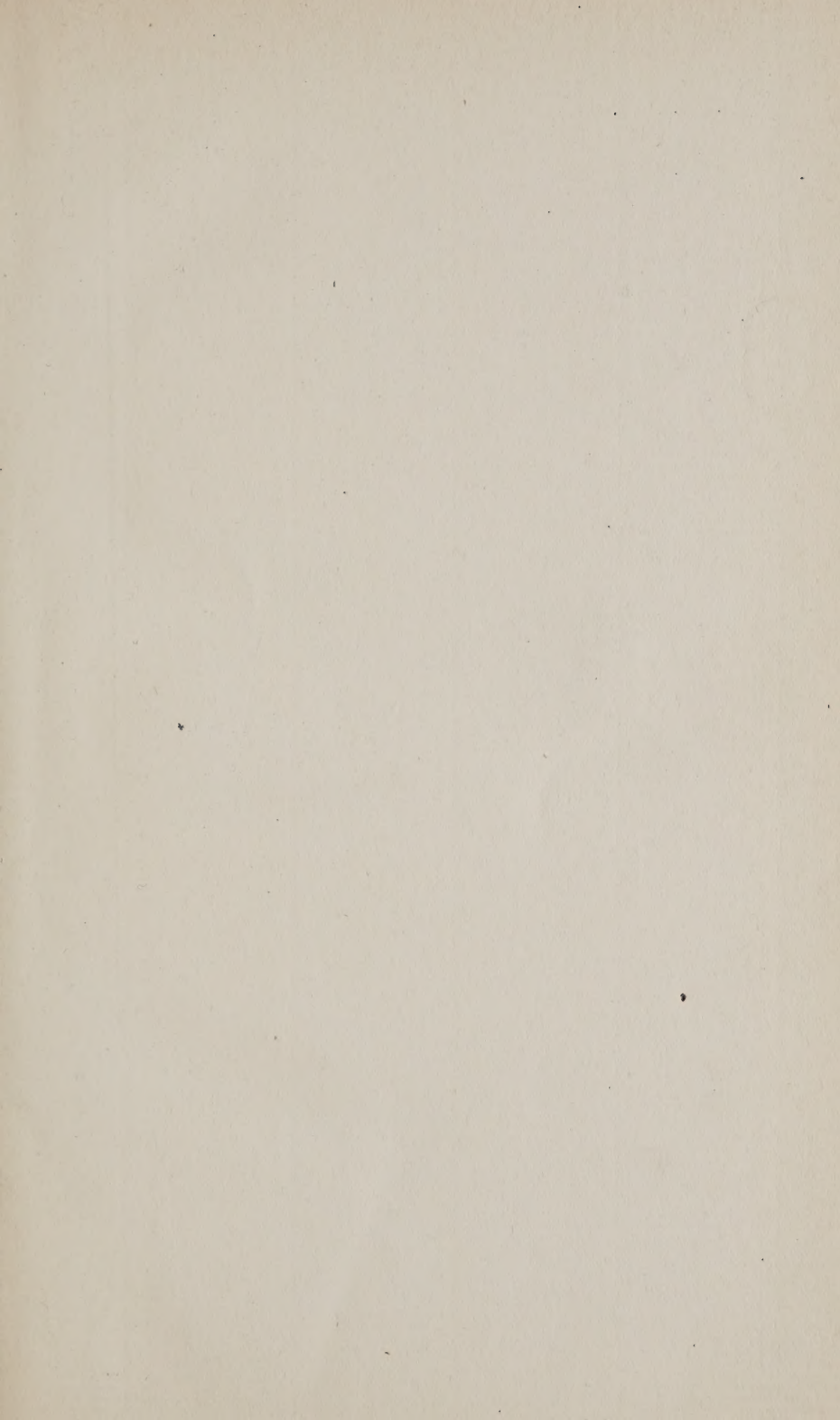
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AGRICULTURAL STUDENTS' GAZETTE.

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STUDENTS AT THE ROYAL AGRICULTURAL COLLEGE,
CIRENCESTER.

NEW SERIES.

VOL. XII.

1904-1906.

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Agricultural Students' Gazette.

VOL. XII.

AUGUST, 1904.

No. 1.

THE "FIRST GARDEN CITY," LIMITED.

"There is a divinity which shapes our ends,
Rough hew them how we will."

There is only one thing quite certain about a new social scheme, and that is that it is quite impossible to foretell what will be the result of it. The promoters of the "First Garden City" have occasionally become prophetic. It is not with their prophecies, however, but with an existing evil and its remedy that it is proposed to treat here. Every scheme aims at doing something, and this particular scheme is rich in having two objects to aim at which are quite distinct from one another.

The first is to relieve the overcrowding of the cities, and so to make some attempt to stop the physical degeneration of the city population. The second is to ensure that no landlord shall step in to reap all the advantages which the creation of new centres of population will bring.

It may be as well to describe here what has actually been done to secure the fulfilment of these aims. A compact estate has been bought near Hitchin, consisting of about 3,800 acres, and including three villages. On this it is proposed to establish a small town of some 20,000 inhabitants, very largely consisting of factory hands. Plans have been prepared, and it has been found that about 1,000 acres will have to be more or less built over, the remaining land being kept as a surrounding ring of country, divided up into small farms and allotments. Several employers have already made advances to the Company to obtain sites for factories, being only too glad to escape the high rent prevalent in all large towns. In this way it is hoped that the factory hands will not only work among healthier surroundings, but will also increase their means of living and improve their physique by being induced to work on allotments on the estate.

None of these advantages, however, could be looked upon as permanent, unless the evils of rack renting and overcrowding were provided against in some especial manner. But it is hoped that the scheme under consideration will secure this provision. The estate has been bought in the first place by a Company started in order to promote these especial causes. As a Company, it is peculiar in being supported by subscribers who are all personally interested in the scheme. No advertising was resorted to, so it may be hoped that the good administration of the scheme will in no way be interfered with by purely business interests. Until the purchase money has been paid off, the objects of the Company are as secure of a fair chance of success

as it is possible to make them. Afterwards—that is, in 30 years time—the subscribed capital will have been repaid, and the whole estate will be handed over to the Garden City, as a municipal body. It has yet to be proved whether any legal forms can be found which will prevent the old evils from gaining a footing in the municipality. But it may reasonably be hoped that the advantages of fresh air and low rentals will be so obvious by that time as to secure their continuance.

The idea which is the mainspring of this experiment is the same which underlies the similar experiments at Port Sunlight and Bourneville; and this idea is co-operation. The “First Garden City” will be too small a unit to be altogether self-supporting, but it will combine the functions of landlord and tenant, and it is certain that many co-operative societies will find it a splendid centre at which to establish themselves. Rents and rates will be under the joint control of employer and employed, and it will be of no advantage to anyone to raise either the one or the other unless it is of advantage to the whole community. In these ways the scheme should encourage the inhabitants to work together, more especially as they will have that great advantage to start with—“a clean slate.” Good drainage, good water, adequate lighting, can all be provided more effectively and more cheaply where there are no prior rights to be considered.

But if it may fairly be claimed that a small element of the town will be brought into the country and greatly benefited by the change, yet it is not so clear that the country will reap any great advantages. There is no doubt always a slight benefit to surrounding farmers when a new centre of industry is created. But if foreign eggs and poultry are sold in Cirencester, they will certainly be sold in Garden City. Fruit and vegetables will still be brought from Essex and the Fen country, and not from the corn lands of Hertfordshire. Agriculture, in fact, must look to itself and not to other people for its salvation.

Though the encouragement of agriculture has been advanced as a reason to support the Garden City, it does not really affect the situation. If a town can be built, with plenty of open spaces, with easy access to the country, and people can be brought from city slums to live in it and own it, then the promoters of the scheme will have done more than most to solve the problem of modern life.

F. H. STORR.

THE DESPISED JERSEY.

The general public seems to realise by this time that the farming world is not very flourishing, but the advice given to farmers in the daily papers, which now frequently have a column devoted to rural subjects, is generally amusing when it is not irritating. I must confess that I am tired of hearing that we import so many millions of eggs, cwts. of butter, cheese, etc., which would make the British farmer

affluent and happy for evermore if only he would take the trouble to produce them at home. As it is the fashion to talk about these things, and as I always like to be fashionable, I propose to write about one of them, *i.e.*, butter. I did at one time think that eggs might pay, but, as foxes eat most of my fowls, I cannot speak from personal experience of the large fortunes made out of egg culture. Butter, I still think, does or might pay if, and this is a very big if, the right sort of cow is kept. How anybody can expect to make butter profitably out of Shorthorn milk is beyond me, although the vast majority of farmers seem to think Shorthorns are the only cows to keep for any sort of dairy work. I will admit that they may be the best for milk-selling, though I rather doubt it, but for butter they are absurd. County Councils do a good deal of good by teaching butter-making in travelling dairy schools, but it is a great pity the question of a suitable cow is rarely touched upon. The Somersetshire County Council did some very interesting experiments on Jerseys v. Shorthorns. These are the only ones that I have heard of except some American ones, at Chicago I think, the particulars of which I have not got. All I can remember is that Jerseys came out best.

In the Somersetshire experiment the weight of the two breeds was taken into account. In this case 6 Shorthorns weighed the same as 9 Jerseys (this proportion is about the average, Jerseys a little over 800 lbs., and Shorthorns over 1200 lbs.) The 6 Shorthorns had the same weight of the various foods as the 9 Jerseys, while cow for cow the amount of butter was the same: the Shorthorns averaged 250 lbs., and the Jerseys 248 lbs. (rather low for Jerseys), so that the Jerseys altogether made a third more butter from the same food. Of course that is not everything. Shorthorn champions will immediately exclaim "think of the wretched Jersey bull calves and the old cows—mere bags of bones." Those little details shall be left for a while.

One isolated set of experiments does not prove much, but it so happens that the figures arrived at in this set agree wonderfully with others, *e.g.*, the butter ratios were found to be 27·0 and 18·9—figures generally accepted. Butter ratios are not considered nearly enough: taking 15d. per lb. as the price of butter, the value of Shorthorn milk for the butter only would be 5·52d. per gallon, that of Jersey milk 7·94d., a very considerable difference. This is assuming that Shorthorn butter makes the same price as Jersey butter, which it does not, the latter being vastly superior in colour, firmness, and flavour. Jersey butter is always a good natural yellow colour, even when the cows are having a large quantity of mangels, as long as they can go out and get a little grass. I confess that my butter is pale in winter if the weather is too bad for them to be out at all. In hot weather Jersey butter is much firmer than Shorthorn butter, and in the very hottest weather I find no difficulty in making butter if the cows are having a little cotton cake.

I believe Shorthorn butter-makers have to get up at some unearthly hour, and even then require quantities of ice. If butter-making

necessitates getting up at four I do not wonder it is not popular. I am afraid I should have given it up long ago. Despisers of Jerseys say various nasty things about them. The four chief complaints of them are (1) they are delicate; (2) barreners and old cows are not worth much; (3) their calves are nearly useless; (4) milk fever. Besides these four real, though, as I hope to prove, slight drawbacks, two other accusations are made against them: that they do not breed regularly, and that they are more liable to abortion. It is very difficult to prove or disprove such assertions; I know of no evidence, and do not myself believe there is any truth in them.

1. I suppose everyone must admit they are more delicate than, say, Highland cattle, but that English-bred Jerseys are appreciably more delicate than any other good milkers remains to be proved. It must be remembered that most Jerseys are either kept in luxurious quarters and coddled for show purposes, or are kept by amateurs and are left to the management or mismanagement of the under gardener. It is not much to be wondered at that if such a cow, accustomed to being rugged and groomed, is suddenly turned out among an ordinary farm herd, she finds the change trying. One Jersey among a lot of big Shorthorns probably has a bad time of it, being smaller and gentler. But I very much doubt if a Jersey, reared in a hardy manner, is particularly delicate. Imported ones are undoubtedly delicate until they have one or two English winters. I believe that Jerseys have got a reputation for being delicate among farmers partly because farmers only speculate in cheap ones, picked up either in the market, where they have probably been sent for some good reason, or at a sale of weeds from a pampered herd. Calves, I believe, are more delicate for the first week, particularly first calves.

2. Barreners are a loss. A middle-aged barren Jersey in good condition (not fat) makes about £7. I suppose a Shorthorn in the same state makes about £12, but as they are usually fattened (at some considerable expense) they appear to make more, perhaps £15, but I think the first figure more truly compares with the £7 Jersey. A really old dry Jersey, skin and bone and nothing more, is not a valuable animal. Perhaps the bidding might soar up to 45s., but then she has been ten years at work, and even a Shorthorn is not worth much after ten calves. A Shorthorn has to be fattened after four or five calves if she is to make a decent price, has, in fact, to be killed when just in her prime for milk. This should be remembered when old Jerseys are sneered at, that in a Shorthorn herd nearly a quarter are heifers, but only about one-eighth in a Jersey herd. A heifer gives very much less milk than an old cow, and barely pays for her keep. Still, barreners and old cows are weak points, but if all the facts are considered the loss is not so very tremendous.

3. Bull Calves. The fuss that anti-Jerseyites make about bull calves is ridiculous. Even a Jersey does not have litters of exclusively bull calves every few weeks. One might think it was the case from the way people talk about the loss on bull calves. What is the loss?

A very young bull only makes 3s. or 4s. in the market, but he makes very good soup, and his meat I have found excellent. I cannot say that a joint from a week old calf is exactly adapted for a dinner party : it looks rather odd. I always have mine killed under a week old, and have no difficulty in selling them for 4d. and 6d. a lb. Sold like this, about six days old, they make nearly 15s., while good Shorthorn calves make that only in the autumn, though they go up to 40s. in the summer, when milk is plentiful. So the loss on a bull calf is only about 15s., which brings the yearly loss down to 7s. 6d., or the value of six lbs. of butter. Perhaps Shorthorn calves would average a better price in other parts of England. Very few of the larger farmers here rear any calves at all—perhaps a few during the first flush of grass—and all the milk goes to London, or to a baby-food factory near here. Many people in the villages in this neighbourhood never have any milk except tinned milk, which somehow does not seem as it should be.

4. Milk Fever. Care has to be taken in calving Jerseys in their prime, but with ordinary precautions the losses from this ought not to be very great. I do not know whether Jerseys are really much more liable to it than any other heavy milkers. Nobody about here seems to have heard of it, or at any rate to be afraid of it. But then a cow with a large udder is a rare sight here. In the market a large fleshy cow always makes a high price, even though her udder is scandalously small. To keep a cow that does not pay for keep for several years for the sake of the price she will make when sold to be killed seems to me a mistake, but then I am not an admirer of Shorthorns in the dairy. Personally, I have not had much experience of milk fever, I am glad to say. I have only had one case in six years, and that cow has calved safely twice since. But I am so afraid of it that I keep my cows in very poor condition before calving, with the result that they remain so for most of the year. I tried calving mine this autumn in better condition, with the result that they are milking better than usual.

The good points of Jerseys are so numerous that I should require the whole of the *Gazette* if I were to enlarge on them. Apart from the richness of their milk they have many advantages over other breeds. They calve earlier, at two years old, a gain of at least six months, and they go on longer ; they keep their milk on for a longer time, and give a steadier supply, which is a very great advantage ; they are more docile and easier to handle ; they are easier to milk (when once the milker has got accustomed to small teats), being very rarely stiff to milk or kickers. Three can be kept on the same food as two Shorthorns.

To show how well they keep up their milk supply, I will give the weight of milk given by my cows the last two years for each month, but I must add that, owing to the wet summer, they gave more than usual in July and August. I also add two months of this year.

I give two dates of calving, otherwise milk yields may be very misleading, for a cow not in calf keeps her milk on much better than one that is breeding regularly.

1902.

Name of Cow.	Date of Calving.	No. of Calves at first date.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
NUMERAL II. ...	{ Dec. 8th, 1901 { Nov. 22nd, 1902 }	5	808	797	781	768	981	965	868	770	566	25	152	891	8372
ROSEBERRY ...	{ Dec. 22nd, 1901 { Jan. 14th, 1903 }	1	685	520	568	586	738	705	676	633	477	415	134	—	6134
TINY'S DAISY ...	{ Nov. 28th, 1901 { Nov. 10th, 1902 }	1	756	643	586	667	931	984	909	777	574	396	343	603	8169
COWSLIP ...	{ Jan. 27th, 1902 { Dec. 29th, 1902 { (premature) }	6	49	627	738	657	852	836	857	735	591	518	331	112	6903
DINAH ...	{ Oct. 1901 { Nov. 28th, 1902 }	7	545	492	510	494	682	620	604	543	382	28	—	498	5398
TINY'S DUCHESS ...	{ Nov. 1901 { Feb. 13th, 1903 }	1	540	511	524	555	688	664	569	473	321	225	145	—	5215
LADY DYNAMO ...	{ Feb. 13th, 1902 { Feb. 15th, 1903 }	3	—	319	740	728	829	836	727	633	506	475	296	180	6269
PRECIOUS ...	{ Sept., 1901 { Oct. 12th, 1902 }	8	320	315	350	431	500	569	536	334	8	286	330	332	4311
PRIMROSE ...	{ May, 1901 { Aug. 6th, 1902 }	3	467	457	554	576	658	517	91	632	866	sold			

Average for 8 Jerseys in the herd all the year, including 3 Heifers, 6,346.4 lbs.

1903. MILK YIELD IN LBS.

Name of Cow.	Date of Calvings.	No. of Calves at first date.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
NUMERAL II. ...	{Nov. 22nd, 1902} {Nov. 17th, 1903}	6	919	775	650	671	712	633	548	358	88	—	393	1187	6934
TINY'S DAISY ...	{Nov. 10th, 1902} {Dec. 5th, 1903}	2	653	619	606	655	833	779	701	601	438	89	—	884	6858
DINAH ...	{Nov. 28th, 1902*} {Jan. 3rd, 1904†}	8	805	647	608	604	697	676	655	551	449	370	106	—	6168
TINY'S DUCHESS...	{Feb. 13th, 1903} {Due Mar., 1904}	2		344	839	1021	1128	1011	871	741	575	454	341	144	7469
DUCHESS III. ...	{Dec. 24th, 1902} {Jan. 28th, 1903}	4	940	920	900	844	928	757	610	548	384	326	242	47	7446
PRECIOUS ...	{Oct. 12th, 1902} {Nov. 14th, 1903}	9	357	338	340	380†									
VERVAIN'S FANCY	{July, 1903 (prematurely)}	5							145	744	716	603	535	529	
DINAH II. ...	Nov. 4th, 1903 ...	1											432	552	

Average for 5 Cows in herd all the year, 6,975 lbs.

* Ill for 3 weeks.

† Lost 2 quarters.

‡ Hired out and then sold with her 10th calf.

Six tests by the Gerber method for percentage of fat are given, and the % varies from 3.1 to 8.1, this last from a cow that was nearly dry and only being milked once a day. The cow, Numeral II., giving the poorest milk, is the only one of the Shorthorn type, and the only one inclined to fatten when in milk. I do not attempt to weigh or measure accurately each cow's food, but I should say that Numeral II. eats at least twice as much as either of my two smallest cows, Dinah and Tiny's Duchess. I may add that she is the only one that has ever been admired by my Shorthorn-loving neighbours, but in spite of that she is, probably, the least profitable.

I give below the returns that might be made from a small herd of the two breeds kept for butter-making, supposing that each cow averages 250 lbs. of butter, and that three Jerseys can be kept for two Shorthorns; also

that the Jerseys average eight calves and the Shorthorns four calves. I will also assume that the Shorthorn butter makes the same price as the other butter—a great assumption. As Jersey calves may be more delicate I allow two to die, and none of the Shorthorns.

Name of Cow.	1904.		% of Fat by Gerber's test.											
	Milk yield.		1903.				1904.							
	Jan.	Feb.	June.		July.		Nov.		Dec.		Jan.		Feb.	
			Morn.	Even.	Morn.	Even.	Morn.	Even.	Morn.	Even.	Morn.	Even.	Morn.	Even.
NUMERAL II. ...	991	781	3.1	4.0	3.4	4.6	—	—	3.2	4.2	3.2	4.4	3.8	3.4
TINY'S DAISY ...	1096	1159	4.4	4.7	4.4	5.0	—	—	5.6	6.0	4.5	5.4	3.8	4.8
DINAH ...	388	601	4.6	7.4	6.3	6.6	8.1	—	—	—	5.1	6.5	5.6	5.5
TINY'S DUCHESS...	—	—	4.1	6.1	5.9	—	5.1	7.1	6.3	—	—	—	—	—
DUCHESS III. ...	32	1044	5.9	4.9	2.8*	5.0	5.6	5.1	—	—	—	—	4.5	6.0
VERVAIN'S FANCY	471	470			5.3	5.3	4.4	5.7	4.3	4.7	(3.5)?	6.3	5.4	5.9
DINAH II. ...	501	457					4.4	5.5	5.2	7.1	(3.4)?	7.2	5.3	6.1
GOOSEBERRY Calved Feb. 19th, 1st Calf	181	709											3.5	5.4

* Held her milk up.

	£	s.	d.
12 Jerseys, 250 lbs. butter at 15d.	187	10	0
450 gallons separated milk and butter milk per cow at 1d. ...	22	10	0
1½ draft cows at £3	4	10	0
5 heifer calves at 30s.	7	10	0
5 bull calves at 4s.	1	0	0
	223	0	0
Deduct 1½ heifers to replace draft cows at £10 ...	15	0	0
	£208	0	0
8 Shorthorns, 250 lbs. at 15d.	125	10	0
2 draft cows at £15	30	0	0
700 gallons separated milk	23	6	8
4 heifer calves at £2	8	0	0
4 bull calves at 30s.	6	0	0
	192	16	8
Deduct 2 heifers at £15	30	0	0
	£160	16	8

To give 250 lbs. of butter the Shorthorns must give over 700 gallons of milk, which is much too high if a quarter of the herd is composed of heifers. These figures might be altered in a thousand ways and made to prove anything, but a fairer comparison would be made by lowering the Shorthorn yield to 200 lbs. from nearly 600 gallons, and by lowering the price of the Shorthorn butter by 1d.

	£	s.	d.		£	s.	d.
Jersey butter	187	10	0	Shorthorn butter ..	93	6	8
Other as before	20	10	0	560 gallons separated milk	19	6	8
	£208	0	0	Other	14	0	0
					£126	13	4

Even if the milk is to be sold wholesale, Jerseys seem to pay much the same money as Shorthorns, and very likely a little more could be made for the Jersey milk.

	£	s.	d.		£	s.	d.
12 Jerseys at 500 galls. at 7d.	175	0	0	8 Shorthorns at 700 galls. at 7d.	163	6	8
1½ draft cows	4	10	0	2 draft cows at £15	30	0	0
Calves as before	8	10	0	Calves as before	14	0	0
	188	0	0		207	6	8
Deduct 1½ heifers	15	0	0	Deduct heifers	30	0	0
	£173	0	0		£177	6	8

It may be objected that as many as twelve Jerseys cannot really be kept in place of only eight Shorthorns, but even if only ten are kept they pay much better than the Shorthorn if my other figures are at all correct. Perhaps the Jerseys ought not to average twice as many calves as the Shorthorns, but I have purposely put the price of the draft Jerseys very low, and a Shorthorn heifer is worth about the same

as the average cow that would be drafted, in fact youngish cows ought to be worth more than the heifers, so that if the Shorthorns were made to average six calves it would not make the figures come out any better.

Even if milk is to be sold, Shorthorns do not surpass Jerseys greatly, and some buyers will give a higher price for Jersey milk. Taking the wholesale price to be 7d., the Jersey herd would bring in £173 and the Shorthorn herd £177, and the higher the price the better the Jerseys would come out, as the loss on the calves and odds and ends would be less in proportion.

A good herd of Jerseys will give very much more than 250 lbs. of butter per cow. One famous herd averages 450 lbs., and plenty of cows will give nearly 3 lbs. daily for weeks, and 2 lbs. daily for months.

The results at the butter competitions at the Dairy, Tring, and other shows, are very instructive. The Jerseys usually beat all other breeds even when the live weight is not taken into account, and in the class for cows under 900 lbs. live weight they have no serious rivals.

ANALYSIS OF THE ENGLISH JERSEY CATTLE SOCIETY'S BUTTER TESTS, 1886-1901.

Cows ages.	Number tested.	Average days in milk.	Milk yield.		Butter yield.		Butter ratio.
			lbs.	oz.	lbs.	oz.	
Over 1 and under 2	2	34	15	2	0	13	18·43
„ 2 „ 3	86	85	24	9	1	5½	18·21
„ 3 „ 4	155	86	30	0¾	1	9¾	18·53
„ 4 „ 5	219	82	31	15	1	11	18·89
„ 5 „ 6	219	85	32	8¼	1	12	18·61
„ 6 „ 7	216	90	32	9¼	1	13	17·88
„ 7 „ 8	181	91	33	15½	1	13½	18·48
„ 8 „ 9	101	94	33	8½	1	12	19·09
„ 9 „ 10	60	99	32	12½	1	12	18·62
„ 10 „ 11	38	97	34	9	1	13½	18·65
„ 11 „ 12	21	94	35	4¾	1	13	19·47
„ 12 „ 13	17	119	33	9¾	1	10½	20·15
„ 13 „ 14	6	129	38	4	1	14½	20·25

On small farms or where only a small herd is to be kept, it seems to me that the Jersey is far and away the best cow to keep, that is not,

a recently imported one, nor a pretty weed from a show herd, but a moderate sized one that has been bred for use and has been reared in a hardy way ; not large coarse cows that are almost Shorthorns except in colour, nor tiny island cows which have never had to rough it at all. A happy medium between the two is wanted, such as the English Jersey Society encourages by its butter competitions. The useful Jersey, treated like an ordinary cow, is not as pretty as an imported one, but mere prettiness is not of much importance for a farmer who wishes to make both ends meet.

A small herd of such Jerseys ought to pay as well as any other branch of farming, and very much better than Shorthorns kept for butter-making. More than 10 or 12 cows would make more butter than can conveniently be dealt with, but it is not very much trouble to make up about 60 lbs. weekly, and in most districts there would be a ready sale for it, edible butter being rare in the country.

The heifers not wanted for the herd may be relied on to make £10 in the market when they have calved at two years old, and most of them could probably be sold privately for £14 or £15. A £10 Jersey at two years pays as well as a £15 Shorthorn nearly three years old. I have sold several lately to farmers who send milk to London, as they are frightened about the quality of their milk, and it is a great compliment to Jerseys that they think the milk of one will sufficiently enrich the milk yielded by their 50 or more Shorthorns, especially as the Jersey milk is usually kept for the house.

It is a great mistake to take for granted that a Jersey is merely a fancy animal only fit for private houses and unable to stand ordinary farm life. For years she will give a steady supply of rich milk, in comparison with which Shorthorn milk is merely skim milk, and a puff of wind will not kill her. A Shorthorn, kept for butter-making, is only profitable when she dies, whereas a Jersey makes her value over and over again while alive and at work, and must not be blamed if she makes only a few shillings at the end of a well spent life.

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AGRICULTURAL DEPRESSION : ITS CAUSES AND CURE.

It is certainly strange that an agricultural country like England should have gradually lapsed into what can now only be described as a chronic state of depression. Agriculture is one of the most, if not the most important of our industries, and when in a prosperous condition re-acts favourably on all other industries, thus indirectly benefiting the towns as well. Formerly, we were accustomed to hear the farming classes spoken of as the backbone of England, and, though temporarily under a cloud, there is no reason why, under more favourable conditions, they should not once again prove themselves worthy of the title ; though, under present conditions, it seems impossible for them to live and thrive by agriculture alone. It is a remarkable fact,

however, that foreigners are able, not only to make it pay, but can assure for themselves thereby a pleasant and comfortable living as well. To all farmers who have learned in the hard school of experience, the causes which account for this anomalous state of things are of course well known; and to them the following remarks will come as mere truisms; and so they are particularly addressed to those whose experience of farming lies all before them in the future.

In using the word farmer or agriculturist, we allude more especially to those smaller farmers who have to make a living out of the profession of agriculture, and not to those who, having private means of their own, can safely risk the experiment, and to whom loss thereby need not necessarily mean ruin partial or complete. Those whose command of sufficient capital enables them to buy *first class* land only, two-thirds of which, say, is grass and one-third arable, are not likely, with sound judgment added, to lose much by the venture, especially if sufficient corn only is grown to keep plenty of stock. And if to this are added other strings to their bow in the shape of fruit culture or dairying, such men can well hold their own anywhere. The men who have failed are those who have attempted to cultivate large arable farms with insufficient capital and have relied almost entirely on the corn crops for profit; while those who have kept no stock at all have been the first to fail; and possibly the very greatest mistake of all has been made by those who, having bought land *because* it was cheap, have attempted to farm more land than the available capital sufficed to properly stock. But here we are to concern ourselves entirely with those humbler farmers who have no capital of their own and can only farm on a very small scale and with borrowed capital.

Firstly, then, the farmer or would-be farmer of this country has not the same facilities for obtaining the necessary capital wherewith to stock his farm and start himself in the business as the foreigner has; and must be prepared to prematurely mortgage his land in order to get the necessary capital without which it is hopeless to make the attempt, and which, on account of the high rate of interest charged for the accommodation, practically precludes all hope of future profit. It is evident that a farmer who has to pay anything from 5% to 8% interest for money, borrowed to start farming, fruit growing, forestry, or the like, cannot possibly live and thrive and educate his family unless he has private means of his own in addition.

Again: farmers in this country have to contend against excessive railway charges for conveyance of their goods, and it is difficult, in this respect, to see how railway companies can improve matters, obliged as they are, in the first instance, to earn large dividends for their shareholders. With the best intention in the world it is impossible for them to open up their systems to any useful extent, in those out of the way districts where the farmer has no way of transporting his goods when ready for the market.

Further: the increasing difficulty experienced in getting skilled labour constitutes another very real grievance with which farmers have

to contend. The status of the labourer has greatly increased during the past twenty years, and to an enormous extent since the year 1837, when his standard of living had sunk so low that wages had constantly to be supplemented by parochial relief. From 1896 to 1900, a continuous rise in wages has taken place in England, Scotland, and Wales; while in Ireland too, in the neighbourhood of the towns, the increase has been general and progressive, through lack of skilled labour. In 1899, as compared with 1898, there was an increase of 4d. per head, while in June, 1901, as compared with 1898, there was a further increase of 8½d. per head, while in parts of Ireland it has become increasingly difficult to get any labourers at all.

Again: the farmers of this country are still further handicapped through the high taxes they are called upon to pay—the basis for which was originally fixed when the country was under “Protection.” And if, as it is contended, the country has greatly benefited through Free Trade at the expense of the farmer, surely the agricultural classes might reasonably expect relief by the former in some scheme of a more equitable adjustment of taxation. Although the value of agricultural land has fallen enormously, rates have risen; and, if it be answered that they have risen in the towns also, the argument means little, for the wealth of the towns has also risen in proportion, whereas, with land, the exact reverse is the case. All who consider the matter must agree that land pays more than its just proportion of taxation, and that the burden should be more equally divided so as to fall heaviest on those lands which from proximity to towns have acquired an unearned increment.

Such, then, are a few of the principal difficulties with which the English farmer has to contend, and which make it well nigh impossible for him to live and thrive.

It has been proposed, and with reason, that the Government should buy up the railways of the country, as in the case of the State railways of Germany; that they should construct light railways in out-of-the-way country districts; or establish a motor service in those parts now destitute of any means of transit. It is argued against this, that the experiment has been tried in Ireland and found wanting. But this can hardly be advanced as serious evidence against success in this country; for the peculiar state of political unrest to which Ireland has so long been subjected will readily account for its non-success there, whereas in any other country it would at least have a fair chance of success. As long as tenant farmers in Ireland are able, as they now are, to get their rents reduced every fifteen years, *provided* they can prove to the Land Court that the land has deteriorated or gone out of cultivation since the last periodical revision of rent, is it likely that they are going out of their way to improve its value, and risk having the rent raised in consequence? In passing, it seems as if English farmers have just as much right as the Irish to demand from the Government the same facilities for buying out their landlords and getting rid of rent for ever, on the same liberal terms that have been granted to the latter.

Another suggestion is that the Government should establish a network of Land Banks over the country with branches in all the principal villages. The ordinary banking systems are not calculated to help small farmers, as the loans in many cases must necessarily remain out so long that the rate of interest charged makes it prohibitive. In the case of hop growing, or fruit or timber growing, for instance, so many years must elapse before a profitable return can be reasonably looked for that ordinary banks are unable to recognise future crops as security, liable as they are to total destruction in a series of bad years. The only security such banks have is the knowledge of the character of the man himself who desires the loan; and it is manifest that business on this system can never be worked on a large scale throughout the country. Loans from landlords, useful enough in individual cases, can never be universal either. The great difficulty of obtaining advances at a low rate of interest has brought many farmers to money-lenders and dealers—common swindlers some of them—who have no intention whatever of making advances, and simply angle for “preliminary” and “inquiry” fees; while in Ireland it has produced the “gombeen” man with his interest of 60% or more. Properly constituted agricultural banks on the Raffeisen system, where borrowers would all be well known to the banks and to one another, would stop all this, for they would be able to advance money with perfect safety at the lowest possible rate of interest, or on special terms of repayment of capital and interest, such as are now paid to the Government by Irish tenant farmers who are buying their farms under the Land Purchase Acts. If these banks were established all over the country, whole districts would be benefited through their means, as they have been abroad. Protectionists tell us that farmers pay increasingly high rates in this country, while foreigners, who enjoy the privileges of our markets, pay nothing towards the taxation of the country; they state further that farmers ask no advantages except safety from being squeezed out of existence. Granted this is so. But can it really be said with perfect honesty that *Protection* is the only remedy for agricultural depression? Granted, also, that continental countries have stemmed the tide of great depression, and in spite of great competition have invaded our markets. But has this not been accomplished rather through scientific and practical education, combined with organisation and co-operation, than by the help of either *Protection* or *Free Trade*? The Agricultural Organisation Society, which owns to no politics and has no party bias, gives proof of what can be done through organisation and co-operation combined. The aim of the Society is to give farmers facilities for obtaining credit on a co-operative basis, which if worked on a large scale would do wonders in stemming the tide of depression in England. In the third annual report of this Society we have an interesting example of the extent to which organisation can help small farmers. A reaper-and-binder was bought by a Notts society with money borrowed from the bank on the joint personal credit of the committee, and has been freely

borrowed and used by all the small farmers around, greatly to their joy and satisfaction. And if this kind of co-operation were general, the smaller British farmers would soon be enabled to stand up to their continental rivals. Germany has achieved the great success of feeding nine-tenths of her population by using artificial manures, which was only rendered possible by the work of Agricultural Co-operative Societies.

If farmers demand a bounty from the Government, it means asking the latter to sanction dearer food for the people, which is hardly what the country wants.

Again: In Ireland at the present time there are some 850 Agricultural Co-operative Societies with a large turnover, nearly all the profits of which have gone back to the farmers and those interested in agriculture. A very striking proof of the value of co-operation in *dairy* practice is given in the *Estate Magazine* for March last. This took the form of an experimental dairy, which was established at Marton with the newest and most up-to-date appliances, at a total cost of £1,200, including vans and horses and every necessary appliance, and has proved itself a perfect success, as the following will show. The farmers in the neighbourhood, we are told, all supported the movement, and in the first completed year (1902) no less than 142,000 gallons of milk were dealt with; and, notwithstanding the initial cost, a net profit of £67 was made. In the year 1903 the quantity of milk bought from the farmers had increased to 164,992 gallons; and after allowing ten per cent. for depreciation a net profit for the year was made of £277, which represented about twenty-three per cent. on the capital. During the year, 30,814 gallons of new milk, 34,617 gallons of cream, 90,436 gallons of separated milk, 34,817 lbs. butter, and 7½ tons of Wensleydale cheese were disposed of. So that co-operative dairying, at any rate, *can* be made to succeed.

We believe that it is neither through Protection nor Free Trade alone, but rather through organisation, with a view to co-operation, that success in farming in this country is to be looked for in the future. Denmark is a Free Trade country, while Germany still adheres to Protection; but in both countries association and co-operation with scientific training are the real causes of success. There is, it is true, another feature which must be taken into account in any attempt to remedy matters, and that is, the national character itself. The love of footballing, horse racing, and sport generally is ingrained in the Englishman's character, but hardly the love of agriculture for itself. For this, we fear, there is no remedy, except through doing all we can to create the desire in the future generation, teaching them the honourableness of the calling of agriculture, its importance to this country, and the necessity for placing it on a firm and sound basis. Much can be done in this respect by establishing garden schools for London children, where a love of gardening would help to develop their powers of observation in the study of nature, and perhaps create in them a love of agriculture in the future. An experiment of this

kind is, we understand, now being carried on at West-hill, Wandsworth, where is a garden of some dimensions in which open air lectures are given, and where the flower beds are divided amongst the children, who are taught to cultivate a patch of ground, and take pride in the result. The real interest taken by the children in these gardens is reported as being remarkable, and is shown by the attention they give to its study, and their deep absorption in the work. In the later life of these children it should, surely, be the duty of the Government to provide for their benefit training schools all over the country, where the science and practice of agriculture could be studied in all its branches. The late Royal Agricultural Show which was held at Park Royal is a striking illustration of the general lack of interest taken by the masses in agricultural matters in this country. The attendance was the worst on record, beating even that of the previous year, and resulting in the loss of nearly £10,000 sterling ; thus, unfortunately, proving that it can no longer be regarded as a self-supporting society. To a great extent, no doubt, this falling off in the attendance was due to a lack of proper advertisement, as many who might otherwise have visited the show were doubtless ignorant whether it was being held in the North or South of England, and would have been greatly astonished had they known that Park Royal was practically in the suburbs of London itself, in fact right at their very doors. Those, however, who attended it were rewarded by seeing much that was new and interesting. The milk drying machine, among other things, was undoubtedly a sign of the times. Milk sold in packets over the counter, and requiring the addition of water only to convert it into the original fluid again, is certainly a novel idea in this country, and if it does not altogether appeal to some of us in these days of milk scare, when germ and microbe have come to stay and must be reckoned with, it is at least a highly interesting experiment which the foreign condensers of milk may do well to take note of. There, too, was to be seen a wonderful farm motor, with a three-furrow plough, and capable of drawing two mowing machines at a time, and doubtless when the price of these machines can be somewhat reduced there will result a substantial saving of time and labour to their fortunate owners. But in these days of new and complicated machinery for saving time and labour, it behoves us more than ever to remember that, in order to attract labourers of the best type to the land again, we must aim at giving them more interest in their lives, so as to make them more contented with their lot, and counteract the drudgery of their lives, which causes so many to migrate to the towns in the hopes of bettering themselves, and for which town life they are so little suited. Labourers' allotments can hardly be said to have realised all that was prophesied for them, tending as they so often do to keep the labourers away from work just at the time when farmers require their services ; and situated, as they sometimes are, in districts where labour is not much in demand.

In conclusion : Whether Protection is or is not the remedy for the present agricultural depression must here be left an open question.

One thing, however, is perfectly clear, viz., that neither under Protection nor Free Trade will the smaller farmers of this country succeed in making the business of agriculture pay without systematic organisation and co-operation to help them now, and without some provision being made to educate the rising generation in the science and practice of agriculture.

DUDLEY S. A. COSBY.*

* Author of *The Irish Land Problem, and how to solve it.* (R. Brimley Johnson.) 1901.

FORESTRY IN THE SOUTH OF IRELAND.

Ever since shipping has become an easy and cheap mode of transit, the British Islands have looked almost entirely to foreign countries for their supply of timber, but, perhaps fortunately, this state of things cannot continue very much longer.

Wherever reclamation of waste lands, for agricultural purposes, has been done in Ireland, it has generally been found an unprofitable undertaking, unless at least one-eighth part be laid out in shelter plantation. Therefore, to meet the increasing home demand and decreasing foreign supply of timber, and also for the general improvement of the climate and soil, the welfare of the country demands an extended and improved system of forestry.

Ireland, like Scotland, was formerly one complete forest; clearance began during the reigns of Mary and Elizabeth, and a wholesale destruction of forests was carried on about the end of the 17th century. After a long period of warfare there came a time of peace; industries sprang up, especially in the south, where Richard Boyle set up numbers of iron works and used wood only as fuel, for he said it was cheaper to bring the ore to the fuel than the fuel to the ore (the latter being imported from England). At the beginning of the 18th century wars began again, practically all remaining forests were devastated, and since then Ireland has never regained its woods.

The United Kingdom imports annually £20,000,000 of timber, and it is estimated that 2,000,000 acres of waste land in Ireland is eminently suited to growing better class timber than that which we import, so that Ireland might produce an annual supply of timber valued at one-third the above sum.

Only about 1·5 % of Ireland is wooded, while 19 % is composed of either turf bog, marsh, or barren mountain. The total area of Ireland under timber is about 308,495 acres, and it may be interesting to note the varieties found.

Larch	...	46,533	acres	Ash	...	7,392	acres
Fir	...	34,104	"	Beech	...	9,952	"
Spruce	...	15,343	"	Sycamore	...	2,930	"
Pine	...	2,524	"	Elm	...	3,303	"
Oak	...	26,604	"	Mixed Trees		159,810	"

Of the 1,246 acres cleared in 1902 only 935 acres were replanted ;

so we may assume that reafforesting operations have not yet begun in this country. That Ireland is admirably suited to the growth of timber is amply proved by the many varieties of splendid trees seen all over the country.

One of the primary objects of planting woods is that they are necessary for shelter purposes, and the more exposed one's property may be, the more shelter woods will be required. Then again, woods are frequently planted for ornament's sake, but at the same time a forester of experience and taste can by judicious planting combine ornamental and profitable woods. Of course this does not refer to single trees in a park or to shrubs planted for the purpose of hiding out some undesirable object. Here in Ireland, where our natural scenery is so beautiful, it would be a great improvement if more taste were employed in laying out plantations, but unfortunately it seems to be a custom to lay them out in regular, harsh squares bounded by stone walls.

Woods, especially those composed of deciduous trees, greatly benefit the land on which they grow ; the leaves when shed gradually decay and yield large quantities of vegetable matter, whilst the roots open up the soil and finally decay.

Woods also modify extremes of temperature and rainfall, and greatly benefit the climate of the locality. When planting up new areas on an estate, attention should first of all be directed to any parts which may be giving little or no return in their present state, either owing to their exposed situation or to their poor and rocky nature. The value of timber as a crop depends largely on the nature of the soil and the climate, and success depends mainly on the forester selecting varieties which already grow and flourish in the locality ; it is a mistake to think that an indifferently made plantation, left to its own devices, will be a profitable investment. When the planting has been carefully completed, the young wood will require constant attention until the trees have established themselves and grown large enough to supersede the growth of weeds. Then the value of the wood is largely dependent on the nature of the soil, and the class of timber planted must be selected accordingly. The mountain slopes in Ireland have a peaty surface and a sandstone subsoil which grow slowly-maturing Scotch and silver firs, but the return is slow compared with that from larch growing on the better land in the valleys, where, owing to the nature of the soil and climate, the timber grows quickly up to 40 years, and then gradually begins to depreciate in value.

Many parts of the South of Ireland are well wooded, but only on a few of the large estates do the woods receive the attention they should. The prevailing crop is a mixture of larch and Scotch fir, and large areas of unprofitable oak scrub which is only fit for firewood. The young trees are generally purchased and not raised in private nurseries, and once planted are left to themselves, and so many of the trees which die off are never replaced, and the wood is allowed to grow up far too thin. There is no system used in the laying out of

new plantations, and the advantages neighbouring agricultural land would gain from a few well-placed shelter woods are never considered. When new plantations are being made very little attention is given to securing them against stock and ground game, so that this also is largely accountable for our woods carrying such light crops per acre. The young woods are never provided with shelter belts, so that one can feel no surprise, even taking the ideal natural conditions into consideration, that many woods have often to be twice planted before they succeed in producing half a crop. Certainly one of the great drawbacks to profitable forestry in this country is the enormous expense entailed, in well managed woods, by the necessity of having to expend so much labour on clearing away grass and weeds from the young trees during their early years, but one can only expect this in a country where growth of all kinds is so luxuriant.

When laying out new areas for plantations, one generally selects the highest and most exposed land, so that when the young trees grow up they may afford shelter to the surrounding district. Should the situation be very exposed, a wide plantation will succeed better than a narrow one, and the side facing the prevailing wind should be convex. Having outlined the site, the next operation will be to attend to the draining should such be necessary, and at the same time the erection of a fence enclosing the area, and rendering it proof against stock and ground game. Then hardy, shelter-bearing, fast-growing pines should be planted six or eight feet apart and eight feet deep around the inside of the fence on the most exposed side; these should be some years older and be planted a year or two earlier than the main crop, so that they may establish themselves and afford shelter to the young trees during their early growth. All steep, rocky slopes bordering mountain streams and rivers should be planted, as these generally produce excellent quality timber, require little fencing, are naturally sheltered, and artificial drainage is not required.

Fencing is a very necessary but expensive item, but it pays ultimately. The most serviceable fence is one made of stones and clay, but this is very expensive unless the stones are easily obtained. The great advantage is, that this class of fence, besides protecting the trees from stock, also acts as a shelter to young plants during their early growth. Wire fencing is also very good, but it is not cheap, as good quality stuff must be used in order to last the number of years during which trees require protection against stock. One great advantage in using wire fencing is that rabbit wire is so easily erected on it, whereas with stone walls the netting must be put up separately inside the wall.

When making new woods, especially in low-lying districts, it is always necessary to drain portions of the land where stagnant water exists. The natural growth generally indicates whether drainage is required or not; if such crops as rushes, bog moss, or sedges be found, it may be taken for granted that the part on which they grow is too damp for forest trees unless drained. Drainage should be as simple as

possible, and all drains should be open and, of course, laid towards the natural fall; it is soon learnt by experience how far apart these drains should be. Frequently in Ireland small spots in a plantation are found which are very soft, and when the drains are made the sides quickly fall in and block them up again; this can be prevented by loosely filling the drains with blackthorn bushes: the water percolates through these, and at the same time the drain is kept open. The drains are generally made 30 inches deep and 24 inches wide, and as much natural fall as possible is given. Here in Ireland the unscientific manner in which woods have been laid out is a great drawback; those which are not actually touching navigable rivers or high roads are for the most part inaccessible with horse and cart, and therefore timber has to be dragged long distances with mules or ponies before a road is reached, diminishing greatly the profits. When laying out plantations a map should be made and roads marked in, so as not to plant on them.

The roads need not be expensively made, as the traffic on them for many years will be small. They should be about fifteen feet wide with a drain on either side, along which laurels, hollies, etc., may be planted for game purposes. Any metalling these roads may require can be put on by degrees and not whilst planting operations are in progress; only old tree stumps and large stones require immediate removal. No part of the wood should be more than fifty yards distant from a road. There is a great difference of opinion as to the right time of year to plant and how to do it. In this climate, undoubtedly the best time of year to plant conifers is during October and November; we seldom have a very severe winter, and the trees have the chance of establishing themselves in the soil before Spring growth begins. On very wet, cold soils the necessary drainage may be done during the winter or even summer, but the planting should not be done until the spring, so that the soil may get somewhat warmed. It is doubtful whether ash should be planted until the frosts of the year are over, but in any case this tree requires a good soil, plenty of shelter, and in return should yield a most profitable crop.

The commoner varieties of trees and their suitability as regards soil and climate:—

Larch bears cold very well and grows successfully in a damp climate, provided the soil is dry and stony. After twenty years' growth it requires light and air.

Douglas Fir.—An excellent forest tree whose value is not as yet fully appreciated. It seems to thrive in all soils and climates, but requires shelter from south-west winds. It is very fast growing, and has wonderful shade-bearing powers. In some parts of Ireland it has been grown on sheltered peaty soils. It must not be heavily thinned. The Washington variety only should be planted, being apparently far hardier than the Colorado variety.

Scotch Pine prefers a light, sandy soil, but succeeds on any light, dry, or wet soil. It requires light.

Spruce thrives on wet, stagnant soils, but cannot withstand a drought. It fails frequently in limestone; bears shade well.

Silver Fir grows on wet, porous, clay soils, but does well in sheltered spots on mountain slopes. It is very shade-bearing.

Mountain Pine is of great use in forming shelter belts, and thrives on all soils.

Oak requires a deep, rich, warm soil, close planting, but heavy thinning after thirty years' growth.

Ash thrives in a moist soil and climate. The soil should be fairly rich and the site sheltered. If planted along the bottoms of valleys the frosts seem to affect it.

Beech seems to grow on all soils, giving preference to lime or chalk. It bears shade well during the early years of its growth.

Sycamore thrives in a damp climate and likes exposure. The soil should be light loam. It requires light.

Although there are several estates in the South of Ireland with large acreages of wood, yet very few of these estates have nurseries, the young trees being purchased as required from nurserymen. The young plants under these conditions are frequently two or three weeks above ground, and then, when they finally reach their destination, the roots of the trees are just covered with earth until required. Under such treatment as this a large proportion of failures must be expected, and this fact should surely soon make landowners realise the necessity of growing their own trees, so as not to require them to undergo a complete change of soil and climate just before they begin fighting for themselves. The landowner may argue that his woods are not extensive enough to employ a man to manage his nursery, and if this is the case, it is better that he should not attempt growing the trees from seed. He may, however, purchase one- or two-year-old plants from a reliable nurseryman and keep these a couple of years in his garden, possibly transplanting them once. Transplanting is a very simple operation to do properly, but it is generally found that much trouble is taken to do it exactly the wrong way. In order to get the roots evenly distributed about the main stem, keep the young plant suspended in the furrow whilst filling in, so that none of the roots touch the hard bottom of the furrow, and all are inclined in a downward direction. When the time has come for thinning operations the worst trees only are removed, and good trees should only be thinned where they are too close together. At the first thinning only dead and small trees should be cut out, but the number of trees removed depends entirely on the class of timber to be dealt with, light demanding varieties being more heavily thinned than shade bearing trees. It must be remembered when thinning, that although a tree may have been utterly superseded by the main crop, yet it is of use for the preservation of the soil fertility by excluding extreme

atmospheric conditions ; yet it must not be forgotten that certain crops, such as larch, demand a certain amount of light and air after twenty years' growth. Thinning should be performed gradually, otherwise the value of the timber will be depreciated, because the quality of the timber depends largely on the regularity of the annual rings. Thinning at all times requires to be done by a competent man. Diseases from which forest trees in the South of Ireland suffer are very few, larch disease being very seldom seen, although the presence of the pine beetle is sadly felt in some districts. The beetles pass the winter in concealment, and begin to fly in March or April, and commence breeding in the bark of dead or felled pines. The insects pair and bore about four inches into the bark, making the passage just next the wood. The female lays about 100 eggs, which turn into larvæ in about ten days, and these bore further into the tree and pupate, and in ten days more become beetles and eat their way out. The insect never attacks a healthy tree as long as there is dead wood about. The young beetles appear about the end of June : some breed the same year, whilst others bore into the growing buds of pine trees. Pine trees felled in the winter and left in the woods until the end of June and then removed carry away with them the young beetles.

The present mode of treatment of woods in the South of Ireland leaves much room for improvement. Before we need think about planting our peaty mountains, we should get our lowland wastes, worth about 2s. per acre for grazing, put under timber. All the scrub oak should be cleared, and larch and Douglas fir grown instead, except where suitable sites for ash and sycamore are met with. By alternating larch strips with plots of Douglas fir, we dispense with the danger of larch disease spreading from one strip to another. For the benefit of owners of mountainous tracts, the Government should make further experiments in this class of forestry. In 1891 the Congested Districts Board planted 500 acres of mountain in the County Galway. Up to 1895 the plantation is said to have cost £10,000 ; all the broad-leaved trees were then dead, the Scots pine was growing poorly, and the only trees which seemed to thrive were the Austrian and mountain pines, neither of which are a profitable class of timber. Under these circumstances the owner of land in Ireland has no encouragement to commence converting his mountain tracts into forests.

R. H. KEANE, M.R.A.C.

ROYAL AGRICULTURAL COLLEGE CLUB.

The annual dinner of the Old Students' Club took place at the Trocadero on Wednesday, June 23rd, and the gathering was the occasion of some exceedingly suggestive speeches. The chair was taken by Colonel Sir Nigel Kingscote, K.C.B., G.C.V.O., a member of the Governing Body of the College, and those present included the Earl of Crewe, Lord Claud Hamilton, the Principal, Messrs. H. F. Waring, G. J. M. Burnett, J. D. Crewdson, F. Silvester, C. Leveson-Gower,

F. C. McClellan, W. F. Garside, S. R. Vernon, A. G. Weigall, R. D. Cumberland-Jones, H. T. M. Wilson, A. Hutchings, E. G. B. Palmer, C. J. Bennett, E. Yatman, T. Polson, A. G. Bloxam, T. A. Dickson, J. Herbert Taylor, with Mr. E. B. Haygarth (hon. secretary), in the vice-chair.

The royal toasts were given from the chair, and loyally honoured.

The Earl of Crewe proposed the toast of "Success to the Royal Agricultural College and its Club." The toast, he said, might have been committed to far more experienced and competent hands, but not to hands more sympathetic than his own. It was some years ago since he was a student at Cirencester, but he felt he owed no inconsiderable debt to the Royal Agricultural College. In the first place, he owed to the College the fact that he was able to abstract from that institution an agent to his predecessor, and since then to himself, in a gentleman so well known as Mr. McCracken, who had been his friend and had helped him to look after his affairs ever since. But in addition to that, he looked back with the greatest satisfaction to the short time he spent at Cirencester as an out-student. He was not one of those who decried the old classical education that was given to boys in this country. He remembered seeing a dedication of a French book addressed to those who, having been reared on a diet of Latin and Greek, had since died of starvation. (Laughter.) He did not, however, take that view, and he should be sorry himself to see the old classical education done away with. But, on the other hand, we lived in a time of technical education, and he had never been able to understand why landowners as a class should be the one set of people for whom technical education should be considered to be unnecessary. It seemed to him it would be an excellent thing if all who possessed land, or who were going to possess land, did as a matter of course during their process of education go through some technical training of the kind which fitted men for landowning or for agency. He was glad to know that the College was not only holding its own but was progressing. It was taking its part in a study of the most interesting and important character, that of Forestry, and he was glad to know that Lord Bathurst, who showed such a kindly and hereditary interest in the fortunes of the College, had in that instance done what he alone could have done, that was to say, given extensive facilities on that beautiful property of his for the study of Forestry among the students. (Applause.) In proposing the toast of the College and the social club connected with it, he was happy to be able to couple with the toast the name of the Principal. He received many kindnesses from Mr. McClellan when he was himself a student. The Principal used to allow him to go up frequently to London to vote in the House of Lords without even inquiring whether he sympathised with the objects of his journeys. (Laughter.)

The Principal said he felt it to be a very great honour to respond to the toast so generously and kindly proposed by Lord Crewe, and he was very greatly indebted for the words his lordship had spoken, and

for the kind feelings manifested by those present. The success of the College depended upon union between all the different classes connected with it. First of all there was the Governing Body, and it was a great gratification to him to see Sir Nigel Kingscote, one of the oldest and most able members of their Governing Body, present in the chair and taking part in their festivity that evening. And besides that, there was not only the Principal, but also the members of the staff, and the students. He remembered looking with great interest some time ago upon a little pictorial allegory in a paper called the *Cable* which represented the landlord, the farmer, and the labourer arm-in-arm together, and the Governing Body, the Principal and staff, and the students must work together as those three were represented to be doing if the College was to have continued success. There was another trio which came into his mind, and that was the trio of Faith, Hope, and Charity. Faith, he thought, might very well represent the Governing Body. (Laughter.) As to Hope, well, the Principal and staff ought always to have hope, and he was quite sure that Charity ought to be the prevailing virtue of the students. If the students showed themselves charitably disposed to the staff, if the staff had hope, and the Governing Body had faith, then the College would have the same success in the future as it had had in the past. They had old students taking part in the administration of the country both in the House of Lords and in the House of Commons. They had other old students concerned in the administration of the Colonies and of India, and they had others taking a very important part in the administration of agriculture and estate agency throughout the country. They all wished long-continued success to the Royal Agricultural Society and its show, and trusted that whoever succeeded Sir Jacob Wilson, an old R.A.C. student, in the onerous and important post he had so ably occupied, would show the same ability that he displayed, and would bring the society to the same state of efficiency that it exhibited in his time. In conclusion, he would express the hope that the College would continue to be a seat of sound learning, and also an *alma mater* to all its students to which they would look back with gratitude and affection.

Mr. Cumberland-Jones proposed the toast of the Royal Agricultural Society of England. The Royal Agricultural Society was the most important of those agricultural organisations which seemed to him to disprove what was very generally, though, perhaps, ignorantly said, viz., that the industry of agriculture was incapable of the art of organisation. The Central Chamber of Agriculture was another disproof of that assertion. The Royal Agricultural Society, besides being the most important agricultural organisation in the country, was also, he believed, the most ancient, for it had performed its work for considerably more than 60 years. The conditions under which agriculture was carried out 60 years ago was very different from the conditions under which agriculture had to strive to-day—(hear, hear)—and he thought it said a great deal for the vitality of British agriculture that in spite of foreign competition, in spite of bad seasons, in spite of

its being a rate-burdened industry, yet for 60 years it had been able, under the auspices of the Royal Agricultural Society, to provide excellent agricultural shows such as the one being held in London at that moment. He knew hardly another industry besides agriculture that was able to hold so excellent an exhibition of its products year by year. The brewers, it was true, held an annual exhibition, but brewing, after all, was a by-product of agriculture. (A voice: "It ought to be.") As his friend Mr. Waring truly said, it ought to be, and they hoped it was. (Laughter.) But besides brewing and painting, agriculture was the only industry capable of holding an annual exhibition. He was privileged to couple with the toast the name of Sir Nigel Kingscote. Sir Nigel Kingscote had been a member of the Royal Agricultural Society for 50 years, he had been a member of the Council for something like 40 years, and he was President of the Society as far back as the year 1878. But he could not forget that Sir Nigel Kingscote was a distinguished Gloucestershire gentleman, and as that was the dinner of what primarily was a Gloucestershire club, it was very fitting that the chair should be taken by a Gloucestershire man.

Sir Nigel Kingscote said he greatly regretted that the toast could not be responded to by Sir Jacob Wilson, to whom the Principal had very fittingly referred. He quite agreed with Mr. McClellan that during Sir Jacob Wilson's *regime* as honorary director of the shows of the Royal Agricultural Society everything was blooming. Sir Jacob would not, he was sure, like him to say it was all his doing, but at any rate it was true to say that since his day the Royal Agricultural Society had not prospered in the way it did before. There were several causes for that, and as far as his own knowledge went the causes were these. In the first place, they had become very big, and their requirements were so large that it became impossible to walk about the country. The ground was forbidden them. For instance, they went to Manchester once, and when they tried to go there again the park they had formerly occupied was gone. They tried to go to Nottingham, and no room could be found for them. In the next place, they had been killed by their own children. Well, he would not say killed, for he hoped they were going on, but now there were shows all over the country, three- and four-day shows, all the neighbourhood went to see them, and they did not come to London to see the "Royal." But he maintained this—and as Chairman of the Finance Committee of the Council for some years and a member of the Council for many years he had had much experience of the facts of the case—they were absolutely driven to adopt the course that had been taken. They could not go on losing three, four, or five thousand a year by being peripatetic, and they thought their best chance was to come to London. He was very disappointed at the attendance both that day and the previous day. Everything was in their favour as regarded weather, they had a glorious show, and if the people would not come they could not help it. For one thing, the show interested people all over the

country. Although they had a bad attendance through the turnstiles yesterday, the railway companies said they brought more people to the show than they did last year. Those were members of the society, and if they could get a sufficient support from members at £1 a year they should probably be able to keep on. As regarded the society itself, they had only to look to the past to see what it had done for the agricultural interest. He looked on the scientific side of the society as being as important as the show side. It was, of course, possible that their scientific work would come to an end now that the County Councils undertook the analysis of manures and feeding stuffs at cheap rates, though the society still got a very large percentage of members coming to it for analysis. The society had also done and was doing a very important work in the matter of education, and he hoped as long as it continued it would give careful and constant attention to the scientific side of its operations. For himself, he had worked hard for the society for a good many years, and if they had to die, though he did not believe they should, they would at any rate die game to the last. (Loud cheers.)

Mr. Haygarth proposed the toast of the Visitors coupled with the name of Lord Claud Hamilton, who, he said, so ably presided over the interests of the Great Eastern Railway, which was the first English railway that gave special advantages in rates for the carriage of agricultural produce.

Lord Claud Hamilton said it was a great pleasure to him to be associated with those who were engaged in the greatest and the oldest of our industries, and to be temporarily associated with one like the Principal, whose duty it was to prepare the minds and intellects of young men so as to enable them to grapple with the many problems which modern scientific agriculture presented. Parliament and people of this country were beginning to recognise that their treatment of agriculture during the last 40 or 50 years had been somewhat mistaken, and there were indications that in a short time an enlightened Parliament and people would adopt a more favourable attitude towards agriculture. He was obliged to Mr. Haygarth for his reference to the Great Eastern Railway. That railway, more largely than any other Company, served a district that was purely agricultural, and they had found agriculturists most responsive to their efforts and advice. It was owing to that spirit that they were able to devise the system of carriage of agricultural produce at reduced rates to which allusion had been made. They had made great headway in the Eastern counties in the direction of greater confidence between one another, and toward a better system of co-operation which was greatly required among agriculturists in England. As regarded the carriage of foreign agricultural produce, however, he was bound to confess strong remarks were sometimes directed towards the Company over which he had the honour to preside, and to which they felt they could always return a perfectly satisfactory answer. A committee of exceedingly able and practical men, appointed by Lord Onslow, was now sitting, who were

prepared to sift those charges to the bottom. With reference to agriculture, he regarded it as the duty of the agriculturist to try and retain the people on the soil, and to attract back those who had left the soil. In that connection he should like to say that though they heard a great deal about the housing of the artisan working classes, they did not consider sufficiently the housing of the agricultural labouring classes. As railway directors, Sir Nigel Kingscote and himself were part owners of a large number of labourers' cottages, and he had devoted great attention for many years to the provision of a cottage which should combine a minimum of cost with a maximum of comfort. By housing railway men in decent dwellings it was extraordinary how they could attach them to the industry with which they were connected, and how they could produce in their minds, and in the minds of their wives and children (which was even more important), a feeling of satisfaction and content which tended to make them loyal servants, and to engender no disposition to leave the locality in which they were comfortably housed. They found they could not build adequate cottages, with kitchen as well as sitting room, for less than £500 a pair, but they had found from experience that for the ordinary agricultural labourer a sitting room apart from the kitchen was almost an unnecessary luxury. No doubt Sir Nigel had, like himself, in his electioneering days, visited cottages in which they found the show parlour a close, damp, unused room, with wax flowers under a glass case, supported by the Family Bible, and the whole resting on a Berlin wool mat. (Laughter.) They had found that cottages of the following dimensions—porch or passage; living room, 13ft. 6in. by 12ft. 9in.; scullery, 8ft. 3in. by 8ft. 7in.; out offices; three bedrooms, 14ft. by 9ft., 13ft. by 7ft. 7in., and 10ft. 3in. by 7ft. 7in.—could be built of brick, with slate roof, fenced and drained, for £430 a pair, on an average of six years' prices, exclusive of the cost of the land. Men earning 20s. or 25s. a week could not afford a rent that would yield a return upon that sum of more than $2\frac{1}{2}$ or 3 per cent., but landowners made a great mistake in looking for a direct monetary return from cottages. They should think of the indirect return in the shape of the loyalty ingrained in the people by having comfortable houses. If landed proprietors who could afford it would do a little more to make agricultural labourers and their families comfortable, there would be less inclination on their part to leave the country and gravitate into the large towns. In conclusion, Lord Claud proposed the health of the Chairman, Sir Nigel Kingscote, whom he described as the most admirable type of the English country gentleman. (Cheers.) Whether as an officer of the Guards, as a member of Parliament, or as a civil servant, Sir Nigel had always shown that high integrity and independence of character which had won for him the respect and affection of all with whom he was brought in contact. (Loud cheers.)

Sir Nigel Kingscote, in returning thanks, said he had been brought up an agriculturist from his earliest youth, and he had always felt that anything he could do for agriculture was not only a pleasure but a

duty as well. As Lord Claud Hamilton had truly said, agriculture had gone through great changes in the last 40 years, but he thought there were signs that it was recovering itself, and they should have good times even yet. The problem of keeping the labourers on the land was a most difficult one, but he could not help thinking with technical education, giving labourers good cottages and a little land close at home, would go toward achieving the end they all desired. They had gone through troublous times. He had for years tried to work for the tenant on the land. It was a great pleasure to him to be there that night. He had had the interest of the College at heart for many years, he had known it from its earliest days, and he had always appreciated what it had done in the students it had turned out to do a beneficial work at home, in India, in the Colonies, and in all parts of the world. Although the College now had many rivals, yet if they kept up that College in its present position, which was high above any other college, they were doing a really good work for the nation at large. (Cheers.)

Mr. Dickson proposed the health of Mr. Haygarth, remarking that he was the life and soul of the club, and without him it would have died a natural death years ago. (Applause.)

Mr. Haygarth, whose health was drunk with enthusiasm, returned thanks, suggesting for their consideration whether some younger man, more closely in touch with the younger generation of students than he was now, should not be associated with him in the secretaryship. He was delighted to be connected with the club. It was founded in the year 1860, and the first recorded notes he had referred to a meeting in 1862, held at Cremorne Gardens. (Laughter.) He ought to say that that year the Royal Agricultural Society held its show at Battersea Park.

POINT-TO-POINT RACES.

A preliminary notice of these races, held on April 9th, is given on page 191 in our last issue. An excellent course was provided at Woodmancote, by the kindness of Mr. R. Stuart and the Rev. J. Priestley Foster, and matters were arranged by the following R.A.C. Committee: Mr. J. M. Lambert, Hon. J. E. Henniker, Messrs. V. R. Vickers, and G. G. Symons, with Mr. A. P. Slingsby as secretary and stakeholder. Earl Bathurst, C.M.G., M.F.H., and Mr. E. B. Podmore, M.F.H., kindly acted as stewards, and the following were the officials: Judge, Mr. Podmore; clerk of the scales, Mr. F. J. Townsend; clerk of the course, Mr. R. Stuart; starter, Mr. R. B. Cooper. The three races attracted a good number of entries, and there was a good attendance of spectators, among those present being Lord and Lady Grantley, Mr. and Mrs. Talbot Rice, Mr. and Mrs. R. Stuart, Mr. and Mrs. S. Dennis, Mr. H. E. Dennis, the Misses Cooper, Mr. J. D. Gouldsmith, Mr. and Mrs. Cecil Gouldsmith, Mr. and Mrs. T. J. Longworth, Mr. A. Severn, Mr. J. S. Mason, Mr. F. H. Unwin, Mr. G. B. Metcalfe, and a good muster of V.W.H. and Cotswold Hunt farmers. A company

of 150, including the officials and farmers, were entertained to luncheon on the ground after the first race, the caterer being Mr. E. J. Viner, of Cirencester. A capital circular course was arranged on the top of the hill, the starting point being near Mr. T. Barton's house, and the finish a short distance off at Old Park, whence a charming view of the picturesque country was obtainable. The fences were not too stiff, and the races were run at a clinking pace. The results follow :

R.A.C. CHALLENGE CUP. For present Students at the R.A.C. First, second, and third prizes presented by Students of the R.A.C. Catch weights over 12st. 7lbs.

Mr. A. P. Slingsby's Barney	Owner 1
Mr. E. B. Lees' Pegasus	Owner 2
Mr. Hamid Yar Jung's Hector	Owner 3
Mr. J. Marston Spurrier's Tom Howard	Owner 0
Mr. J. Drummond Deane's Invicta	Owner 0
Mr. V. R. Vickers' Surprise Packet	Owner 0
Mr. J. M. Lambert's Sammie	Owner 0

Invicta made the running until refusing at the first wall. This let up Hector, Pegasus, and Barney. These three horses took the last fence in close company. Going down the greensward Barney overhauled Pegasus and won by a short neck ; Hector a good third. Invicta was fourth.

OPEN RACE. Sweepstake of £1 each, and Cup added, for horses the property of, and to be ridden by, Subscribers of not less than £5 to the funds of either of the V.W.H. and Cotswold Hounds First prize, £6 and cup ; second, hunting flask ; and third saves stakes. About 3 miles ; catch weights over 13st. ; owners up allowed 7lbs.

Mr. J. Adamthwaite's The Draper	Mr. G. White 1
Mr. T. J. Longworth's Félise	Owner 2
Mr. F. H. Unwin's Rosina	Owner 3
Mr. A. Severn's Mulum in Parvo II.	Owner 0
Mr. C. C. Gouldsmith's Flavia	Owner 0
Mr. J. S. Mason's Paddy	Owner 0

Flavia cut out the running at a smart pace, but half-way round got the wrong side of the flag. Down the ploughed field to the start for home The Draper got up, and though running wide caught Flavia as they dropped over the last fence, and won by three-parts of a length. Length and a half between second and third. Flavia was disqualified and Rosina placed third. Félise ran out at the turn for home, but for which The Draper would have had a keener struggle for victory.

On arriving at Cheltenham it was found that Mr. Unwin had sustained a fracture of the collar bone when Rosina was cannoned by Flavia at the wall half-a-mile from home, after which Mr. Unwin had remounted and made a determined finish, duly weighed in, and made no complaint of being hurt.

FARMERS' RACE. For horses regularly hunted with either of the V.W.H. and Cotswold Hounds during the present season, the property of *bona fide* Tenant Farmers residing in the V.W.H. and Cotswold Hunts, to be ridden by them, their sons, or subscribers to the hunts. Winner, 15 sov. ; second, 5 sov. ; third, 3 sov. Catch weights over 13st. ; distance 3 miles ; owners up allowed 7lbs. Farmers farming over 100 acres over whose land the R.A.C. Beagles have hunted also eligible for this race.

Mr. T. A. Gray's Little Sister	...	...	...	...	...	Owner	1
Mr. J. Clem Barton's Matchbox	...	...	...	...	...	Mr. Barton	2
Mr. E. A. Retter's Decided	...	...	...	...	...	Mr. Bennett	3
Mr. R. F. Stratton's Brigantine	...	...	...	...	...	Owner	0
Mr. G. Fletcher's Rising River	...	...	...	...	...	Mr. Fletcher	0
Mr. G. Fletcher's Whippet	...	...	...	...	...	...	0
Mr. J. T. Hobbs's Dainty Lad	...	...	...	...	...	Mr. Bert. Hobbs	0
Mr. G. W. White's Nancy II.	...	...	...	...	...	Owner	0
Mr. C. J. Horton's Lucifer	...	...	...	...	...	Owner	0
Mr. J. A. Attwater's Cheerful	...	...	...	...	...	Mr. J. D. Gouldsmith	0
Mr. F. Moss's Black Boy	...	...	...	...	...	Owner	0
Mr. Hewinson's Duchess	...	...	...	...	...	Owner	0

Won by a length, half a length between second and third. The field kept close company until within sight of home. The winner was well ridden and won handsomely. Lucifer was fourth. Mr. G. Fletcher's Whippet fell and broke her back at a wall, and had to be shot.

Mr. and Mrs. Robert Stuart very kindly entertained a large number of visitors at luncheon, and a good deal of the success of the meeting was due to their kindness to R.A.C. Students and their friends.

On March 30th Mr. Carlos Larios won the Gibraltar Point-to-Point race on "Mac." There were fifty-five starters over a difficult course, and Larios (R.A.C., 1891) took a strong lead and won as he liked by nearly a quarter of a mile.

COLLEGE NOTES.

VISIT OF THE SURVEYORS' CLUB.—On Wednesday, June 29th, the College had the pleasure of receiving a visit of this old and important Club, of which Mr. Chas. W. Driver is hon. secretary. By permission of Lord Bathurst, and under the guidance of Mr. Robert Anderson, president for the year, the Club made an excursion through the Park and Oakley Woods, partaking of luncheon in the Wood House: and thence in the afternoon they paid a pre-arranged visit to the College, where they were received by the Principal and the Professors, and after inspecting the museum, laboratories, botanic garden, and the various departments, they were entertained to tea in the College Hall. A letter was afterwards received by the Principal from Mr. Driver, expressing the Club's gratification with their visit.

FORESTRY EXHIBITION AT PARK ROYAL.—The Show at Park Royal this year included, as has of late been the custom, a shed for an Educational Exhibit; and as Forestry was to be especially represented, the College sent up a collection from this department, including various planting, pruning, and cleaning tools more or less in use on the Continent, some of the best known Continental height-measurers, plans and photographs of the Cirencester woods, a large collection of photographs of well-known German forests, and some examples of Continental working-plans and maps. The Educational Section was on the whole very successful, though the shed allotted to it was small, and placed in an extreme corner of the ground; and the College exhibit

suffered in effect from having no sign-board, and from being scattered about in various parts of the shed. There were some demonstrations by the Show Officials with Continental tools: but as only a patch of imported soil was available for these, they were carried on under difficulties. It is hoped that if the College authorities send any exhibit on a future occasion, they may be able to arrange for some of the other departments also to be represented, and at the same time to depute some special representative to look after the staging of what is sent. The Educational Section (although inside the shed there was somewhat of an atmosphere of advertisement) was one of the most interesting features of a very fine Show.

FORESTRY MUSEUM.—The thanks of the College Authorities are due to Mr. Sidney Priday, of Eastcheap, London, E.C., for four very fine sections of Austrian wainscot oak; to Mr. J. H. Milne-Home, M.R.A.C., for samples of creosote and creosoted fencing material, and workmen's labour and material forms in use on the Duke of Roxburgh's estate; also to the Deputy-Surveyor of Windsor Park for specimens of fungi.

FORESTRY EXCURSIONS.—Excursions have been made during the term to Messrs. Jefferies' nurseries; to Mr. Elwes' plantations at Colesbourne; and to Messrs. Nicks' timber yard at Gloucester, where, by the kindness of Mr. Hooper, a demonstration in creosoting was held.

FARM NOTES.

At the Newmarket bloodstock yearling sale on June 30th, Mr. Russell Swanwick sold a colt by Diamond Jubilee out of Dame Agneta for 1850 guineas to Mr. W. Bass; also, a filly by Velasquez out of Ferrara for 440 guineas, and a filly by Elopement or Grand Duke out of Lady Raeburn for 400 guineas.

EXCURSION TO ROTHAMSTED.

On Tuesday, June 28th, a party of students, with the Professors of Chemistry and Agriculture, visited Rothamsted at the invitation of the Lawes Agricultural Trust and the Director, Mr. A. D. Hall, M.A. A most thoroughly instructive and pleasant day was spent under the guidance of the Director, who spared no pains in explaining the experiments. Fortunately for the party, the grass plots had not been cut, so that the differences in the nature of the herbage could be well seen; in many cases these are becoming more accentuated: a botanical examination was made last year, and the publication of the results of this is looked forward to with much interest. The trial of calcium cyanide against ammonium sulphate on the root crops was not sufficiently advanced to show any differences. We trust that this excursion will again become an annual event, as it was in former years,

for only by actually seeing the station can the results of its teaching be really assimilated. The thanks of the staff and students of the College are due to the Lawes Trust and its able Director for their kindness and hospitality.

OBITUARY.

We regret to record the death of Mr. Dudley A. West (M.R.A.C., August, 1896), who died of yellow fever at Vera Cruz, Mexico, on June 26th last. His father (M.R.A.C., 1866), of White Park, Brookeborough, co. Fermanagh, as well as his brother, Augustus W. West (M.R.A.C., 1891), were former students at the College. Mr. Dudley West has had a very successful career in South Africa in prospecting and mining operations. His early and sudden death puts an end to a life of great promise.

CHLORINE IN RAIN-WATER.

The rainfall for the six months ending March 31st was 20·69 inches, falling on 120 days. It contained, on an average, chlorides equivalent to 396 grains of sodium chloride per gallon, this being equal to a deposit of 26·34 lbs. per acre.

For the twelve months ending at the above date the rainfall was 42·07 inches, with 213 rainy days; and the chlorides contained in the rain-water was equal to a deposit of 43·21 lbs. of common salt per acre.

E. K.

SURVEYORS' INSTITUTION.

At the last Spring examination the following R.A.C. students passed the examination for the Professional Associateship of this Institution: B. Blackburn, M.R.A.C., C. F. A. Cooper, C. E. A. Ermen, M.R.A.C., H. J. Fagan, M.R.A.C., E. W. Farwell, M.R.A.C., Evan Highway, M.R.A.C., W. H. Parker, M.R.A.C., L. C. Sharma, M.R.A.C., and G. W. S. Sparrow, M.R.A.C.

The following passed the Fellowship examination: H. B. Beddall, M.R.A.C., J. T. C. Hazledine, M.R.A.C., and F. H. G. Osmond-Smith, M.R.A.C.

DIPLOMA EXAMINATION.

The following gentlemen obtained the Honour Diploma of Membership at the end of the Spring term:—Messrs. Evan Highway, Wilmot Driffild Stevens, Humprey Middleton, Ernest Allison Iredale, Leslie Hewett, Vincent R. Scott Vickers, Gilbert George Symons, Fritz George, and Henry George Berkeley.

The external examiners were—in Agriculture, Mr. George Taylor; in Agricultural Chemistry, Dr. J. A. Voelcker; in Land Surveying and Engineering, Professor H. Robinson; and in Veterinary Science and Bateriaology, Professor Sir G. T. Brown.

SCHOLARSHIPS.

The first Scholarship was gained last term by Albert Sasson, whilst the second and third were divided between H. S. Mathews and Cyril A. Cooke.

OLD STUDENTS.

R. W. Brigstocke, M.R.A.C., has joined the Behera Company of Lower Egypt, and is engaged in developing the agricultural resources of the country at Taflish Sidi Salem, Kafr el Sheikh. Cattle plague is just now prevalent in the district and interferes greatly with the progress of cultivation; mules have been tried as a substitute, but are not very satisfactory workers on the farm. Mr. Brigstocke has been inoculating cattle against the plague, and the results are so far very satisfactory.

Mr. Salvago, M.R.A.C., has also joined the same company.

Mr. H. C. Waterfield, M.R.A.C., has been appointed Private Secretary and Controller of the Household to Lord Plunkett, Governor of New Zealand, and has sailed to take up his duties at Wellington.

Mr. Consul-General Basil S. Cave, C.B. (M.R.A.C., 1886), has been appointed H.M. Agent and Consul-General for Zanzibar, Pemba, and German East Africa.

Mr. A. F. Douglass (M.R.A.C., 1885), at present agent for Sir P. Grey-Egerton, Bart., Oulton Park, Tarporley, Cheshire, and for the Ayrshire estates of Mr. J. H. Stock, M.P., of Glenapp Castle, has been appointed agent to Lord Downe's extensive estates in Yorkshire and Northamptonshire.

CRICKET.

R.A.C. v. EAST GLOUCESTERSHIRE.—This match was played on the College ground on Wednesday, June 1st, and resulted in a victory for the visitors by 23 runs. East Gloucestershire batted first on a bad wicket, and fared badly against the excellent bowling of Lyon and Gandy, being all out for the moderate total of 83 runs, Pinney carrying out his bat for an invaluable 39. The College did even worse in their venture, being disposed of for 60, Lawson being top scorer with 20. Rain commenced just after the home team started batting and continued throughout the remainder of the game. Score:—

EAST GLOUCESTERSHIRE.				R.A.C.			
Boroughs, b Lyon	...	...	4	J. Poore, run out	...	...	0
Captain Pinney, not out	...	..	39	H. C. Bell, b Parker	...	...	1
A. S. F. Pruen, b Lyon	...	...	0	E. F. Longcroft, run out	...	...	6
E. Webb, b Gandy	...	...	1	A. S. White, c Parker, b Tidmarsh	...	...	5
Major Williams, b Lyon	...	...	0	G. Lyon, b Tidmarsh	...	...	5
R. Tidmarsh, b Lyon	...	...	4	W. W. Dobson, b Tidmarsh	...	...	0
R. N. Willoughby, 1-b-w, b Lyon	...	...	2	G. Lawson, b Woof	...	...	20
H. H. Beardsley, c Bell, b Lyon	...	...	4	E. Hopton, c Woof, b Tidmarsh	...	...	2
J. M. Spurrier, 1-b-w, b Gandy	...	...	0	G. M. Dobson, b Tidmarsh	...	...	0

Woof, b Gandy	...	...	8	R. C. Mankowski, c Williams, b			
Parker, run out	...	...	8	Tidmarsh	...	...	1
				Gandy, not out	...	...	10
Extras	...	...	13	Extras	...	...	10
Total	..	...	83	Total	...	...	60

R.A.C. v. CHELTENHAM COLLEGE.—In this match which was played at Cheltenham on Saturday, June 4th, the home team secured an easy victory over the R.A.C. Score:—

				R.A.C.			
J. Poore, b Mackenzie	...	...	0	c Rawson, b Mackenzie	...	...	0
G. Lawson, b Brett	...	...	21	b Mackenzie	...	...	1
H. C. Bell, b Smythies	...	...	1	not out	...	...	4
A. S. White, c Thorburn, b Peel	...	...	28				
G. Lyon, c Gardiner, b Brett	...	...	0	c Rawson, b Smythies	...	...	1
K. McDiarmid, c Smythies, b Peel	...	...	2	st Taylor, b Smythies	...	...	2
W. W. Dobson, b Peel	...	...	1	c and b Mackenzie	...	...	3
H. Jung, c Smythies, b Thorburn	...	...	3				
E. Hopton, b Thorburn	...	...	8	not out	...	...	1
H. H. Beardsley, c and b Thorburn	...	...	10				
J. M. Spurrier, not out	...	...	0	b Mackenzie	...	...	0
Extras	...	...	5	Extras	...	...	4
Total	...	...	79	Total (6 wickets)	...	...	16

CHELTENHAM COLLEGE.

G. G. Rawson, 1-b-w, b Lyon	...	...	...	...	2
D. P. Dickman, b White	...	...	...	...	1
M. G. Salter, c McDiarmid, b Hopton	...	...	...	...	43
A. C. Tennant, b Lyon	...	...	...	...	12
D. R. Peel, b Lyon	...	...	...	...	1
R. T. H. Mackenzie, b McDiarmid	...	...	...	...	20
W. H. Gardiner, c Bell, b McDiarmid	...	...	...	...	3
J. E. J. Taylor, b Lyon	...	...	...	...	25
J. G. Thorburn, c Dobson, b Poore	...	...	...	...	6
E. A. Smythies, b Hopton	...	...	...	...	16
C. T. Brett, not out	...	...	...	...	0
Extras	...	...	...	...	20
Total	..	...	...	...	149

R.A.C. v. ST. PAUL'S COLLEGE, CHELTENHAM.—Played on the R.A.C. ground on Wednesday, June 8th, an interesting game resulting in a tie. Score:—

R.A.C.				ST. PAUL'S COLLEGE.			
A. S. White, b Hill	...	...	15	T. P. Wilson, b White	...	...	0
G. Lawson, 1-b-w, b Hill	...	...	14	H. B. Longman, 1-b-w, b Lyon	...	...	4
H. C. Bell, b North	...	...	13	T. R. Leonard, b White	...	...	0
E. F. Longcroft, c Leonard, b Cook	...	...	0	E. N. Darling, c Lawson, b Hopton	...	...	22
G. Lyon, c May, b North	...	...	15	T. W. Cook, c Beardsley, b Hopton	...	...	20
J. Poore, c Leonard, b North	...	...	9	C. T. Rhys, b Longcroft	...	...	1
K. McDiarmid, b North	...	...	3	L. A. Hill, b White	...	...	24
H. H. Beardsley, c Longman, b				B. R. Gent, 1-b-w, b McDiarmid	...	...	36
Darling	...	...	4	C. B. Beynon, b Lyon	...	...	7
H. Jung, b Hill	...	...	16	G. W. W. Way, 1-b-w, b Lyon	...	...	0
E. Hopton, not out	...	...	19	E. A. G. North, not out	...	...	1
G. M. Dobson, b Hill	...	...	0				
Extras	...	...	14	Extras	...	...	7
Total	...	...	122	Total	...	...	122

R.A.C. v. SWINDON.—This match was played on the College ground on Saturday, June 11th, and the visitors won easily by an innings and 77 runs, this being their first win of the season—after being defeated six times in succession. Score :—

SWINDON.

R. Reynolds, c Lawson, b Poore...	...	...	...	...	34
G. W. Matthews, l-b-w, b Lyon...	...	...	...	...	15
D. C. A. Morrison, c Lawson, b White	...	...	...	...	34
S. Warner, b White	...	...	...	...	16
C. Williams, b Longcroft...	...	...	...	...	24
Harling, not out	...	...	...	...	27
F. Wilson, c and b Lyon	...	...	...	...	0
W. R. Osborne, b Lyon	...	...	...	...	0
H. Davies, b Lyon	...	...	...	...	0
E. Beardshaw, b Longcroft	...	...	...	...	0
A. Ash, b Gandy	...	...	...	...	3
Extras	...	...	...	...	11
Total	...	...	...	...	164

R.A.C.

A. S. White, c Morrison, b Harling	1	b Williams	...	...	...	7
G. Lawson, b Wilson	4	b Williams	...	...	...	15
H. C. Bell, run out	0	b Davies	...	...	...	4
Gandy, c Harling, b Wilson	0	c Matthews, b Williams	...	...	...	2
G. Lyon, b Wilson	5	b Williams	...	...	...	0
J. Poore, c Williams b Harling	1	not out	...	...	...	14
E. F. Longcroft, c Williams, b Wilson	3	c and b Williams	...	...	...	0
H. Jung, b Wilson	0	b Davies	...	...	...	3
W. W. Dobson, l-b-w, b Harding	2	b Davies	...	...	...	2
K. McDiarmid, not out	6	b Williams	...	...	...	0
H. H. Beardsley, b Wilson	7	c Morrison, b Williams	...	...	...	0
Extras	5	Extras	...	...	...	6
Total	34	Total	...	...	...	53

R.A.C. v. ROSELEIGH.—Played on the Roseleigh ground, Cheltenham, on Wednesday, June 15th, and resulted in a win for the Collegians by the narrow margin of eight runs. Score :—

ROSELEIGH.

Elmes, c Longcroft, b Lyon	...	2
Pleydell, c Lawson, b Poore	...	17
F. Matthews, b Lyon	...	3
E. Webb, b Lyon	...	4
A. Woodward, b Lyon	...	1
A. Sheppard, b Lyon	...	6
W. D. Steppings, c Lawson, b Poore	...	3
A. Webley, b White	...	12
Febrey, run out	...	1
Smith, c and b Lyon	...	4
Sollars, not out	...	7
Extras	...	2

Total ... 62

R.A.C.

A. S. White, b Woodward	...	0
G. Lawson, b Elmes	...	4
H. C. Bell, c Steppings, b Woodward	...	3
T. Poore, c and b Elmes	...	5
R. C. Manskowski, b Elmes	...	20
A. Horson, b Woodward	...	16
E. F. Longcroft, c Febrey, b Elmes	...	0
H. Jung, c and b Elmes	...	7
R. McDiarmid, b Woodward	...	7
H. Beardsley, run out	...	7
J. Spurrier, not out	...	0
Extras	...	1

Total ... 70

R.A.C. v. CIRENCESTER.—This match was played on the College ground on Saturday, June 18th, the R.A.C. suffering a severe defeat at the hands of the Town. The College batted first, but could do nothing with the bowling of Allen and Tovey, 6 wickets being down for only one run, the whole side being out for

27. The chief feature of the Town's innings was the partnership of W. G. Tovey and Allen, which produced 164 runs. Allen's 104 contained 14 fours. Score :—

R.A.C.				CIRENCESTER.			
A. S. White, b Tovey	...	...	0	R. W. Ellett, b Lyon	...	...	3
R. C. Mankowski, b Tovey	...	...	0	R. J. Mullings, b Gandy	...	...	0
G. Lyon, b Allen	...	...	0	C. Allen, c and b White	...	...	104
J. Poore, b Allen	...	...	0	H. St. G. Rawlins, b Lyon	...	...	0
Gandy, b Allen	...	...	0	H. W. Bishop, b Gandy	...	...	1
E. Hopton, b Allen	...	...	0	R. Wood, b Gandy	...	...	0
H. Jung, b Tovey	...	...	0	W. G. Tovey, c and b Poore	...	...	76
H. C. Bell, b Tovey	...	...	9	S. Boulton, c Jung, b Poore	...	...	29
G. Lawson, not out	...	...	5	H. J. Tovey, not out	...	...	49
K. McDiarmid, b Tovey	...	...	7	C. O. H. Sewell, b Poore	...	...	3
H. H. Beardsley, b Tovey	...	...	0	Jennings, c Lawson, b McDiarmid	...	...	8
Extras	...	...	6	Extras	...	...	13
Total	...	...	27	Total	...	...	286

R.A.C. v. CHELTENHAM.—This match was played at Cheltenham on Wednesday, June 22nd, the visitors being completely outplayed. Score :—

R.A.C.				CHELTENHAM.			
G. Lawson, b Straw	...	...	13	E. de S. H. Browne, retired	...	...	101
H. C. Bell, st V. Barnett, b Straw	...	...	10	E. Barnett, retired	...	...	66
A. S. White, c E. Barnett, b Mills	...	...	12	W. Wolf, b Lawson	...	...	1
J. Poore, b Straw	...	...	2	C. S. Barnett, st Kearton, b Bell	...	...	52
K. McDiarmid, b Straw	...	...	8	C. H. Margrett, c Lawson, b White	...	...	63
Gandy, b Straw	...	...	9	G. Straw, b White	...	...	5
H. Jung, b Straw	...	...	0	F. M. Norman, b Gandy	...	...	2
W. W. Dobson, b Straw	...	...	10	A. A. Dighton, c and b Poore	...	...	33
H. H. Beardsley, c Mills, b Dighton	...	...	1	Mills, c Beardsley, b McDiarmid	...	...	21
G. H. C. Kearton, b Straw	...	...	0	V. Barnett, not out	...	...	13
W. Ogilvie, not out	...	...	1	H. Chester, not out	...	...	4
Extras	...	...	4	Extras	...	...	36
Total	...	...	70	Total	...	...	393

R.A.C. v. 4TH BATTALION GLOUCESTERSHIRE MILITIA.—Played on the College ground on Wednesday, June 22nd, and resulted in an easy win for the R.A.C. Score :—

MILITIA.				R.A.C.			
Lieut. Little, b Gandy	...	...	2	J. Henniker, 1-b-w, b Underwood	...	...	8
Pte. Richings, c Lawson, b White	...	...	2	G. Lawson, b Underwood	...	...	17
Col. Sergt. Wood, c Beardsley, b Gandy	...	...	2	E. B. Lees, c Wood, b Little	...	...	1
Lieut. Lembcke, c Kearton, b White	...	...	17	A. S. White, 1-b-w, b Little	...	...	11
Pte. Underwood, b White	...	...	9	H. C. Bell, c Underwood, b Little	...	...	2
Sergt. Scaife, b White	...	...	0	K. McDiarmid, b Richings	...	...	47
Pte. Godwin, b Gandy	...	...	2	Gandy, b Little	...	...	34
Capt. Marling, c Bell, b McDiarmid	...	...	17	H. H. Beardsley, b Richings	...	...	6
Lieut. Gore, b Gandy	...	...	0	W. W. Dobson, 1-b-w, b Richings	...	...	0
Pte. Evans, b McDiarmid	...	...	9	G. H. C. Kearton, b Little	...	...	2
Pte. Chandler, not out	...	...	2	H. de B. Archer, not out	...	...	0
Extras	...	...	12	Extras	...	...	12
Total	...	...	74	Total	...	...	140

R.A.C. v. STROUD.—Played on the College ground on Saturday, June 25th, and ended in the defeat of the Collegians by an innings and 34 runs. The home side disposed of the visitors for 127, E. Hopton taking five wickets for 27 runs,

Gandy three for 29, and G. Lyon two for 52. The College were dismissed for 31. C. Merrett took six wickets for 17 runs and H. Poole four for 13. A second effort realised 62 runs. Score :—

STROUD.

E. L. Sale, b Lyon...	...	...	...	...	...	4
J. C. Sale, b Gandy ..	...	...	...	...	...	29
C. Merrett, 1-b-w, b Lyon..	...	...	...	...	...	2
W. J. Gallop, c Lyon, b Gandy ...	...	...	...	...	...	7
Rev. A. W. Sale, c Bell, b Hopton	...	...	...	...	...	0
S. B. Darke, b Hopton ..	...	...	...	...	...	13
J. J. Stephens, b Gandy ...	...	...	...	...	...	6
H. O. Crew, 1-b-w, b Hopton	...	...	...	...	...	17
W. F. Croome, b Hopton...	...	...	...	...	...	24
B. D. S. Warman, c Bell, b Hopton	..	...	...	...	...	4
H. Poole, not out ...	...	...	...	...	...	2
Extras ..	...	...	...	...	...	19
Total ...	...	...	...	...	...	127

R.A.C.

E. S. Gooch, c Croome, b Merrett	6	c and b Merrett	...	...	...	0
G. Lawson, b Poole...	5	c Darke, b J. Sale	...	...	...	4
R. C. Mankowski, b Poole...	10	b Poole	...	...	...	2
A. S. White, c Warman, b Poole...	2	not out	...	...	...	0
K. McDiarmid, c Darke, b Poole...	0	b Poole	...	...	...	12
G. Lyon, b Merrett...	1	b Poole	...	...	...	12
H. C. Bell, c Warman, b Merrett...	0	c and b Poole..	...	...	...	4
J. Poore, st Darke, b Merrett	0	c Crew, b Poole	...	...	...	0
E. F. Longcroft, b Merrett	4	b Poole	...	...	...	6
H. Hopton, c Warman, b Merrett	0	b Poole	...	...	...	6
Gandy, not out	2	b Poole	...	...	...	7
Extras	1	Extras	...	...	...	11
Total ...	31	Total ...	...	...	...	62

PAST V. PRESENT.—Played on July 20th and 21st. The Present went in first on Wednesday, and the first innings were completed on that day. During the afternoon Mrs. McClellan entertained, by invitation, a large number of spectators and friends of the College. On Thursday, the Present, who were 28 runs behind on the first innings, fared worse in their second venture, the Past being left to get 89 runs to win, which proved an easy task. For the Present, Bell both batted and bowled well, capturing 8 wickets for 70 runs. Symons and Stenhouse were the most successful batsmen for the Past, and Ward was their most effective bowler. Walford's smart wicket-keeping was quite a feature of the match. Score :—

PRESENT.

G. Lawson, c May, b Ward	...	4	b Ward	...	...	...	13
A. S. White, c Stuart, b Dickin	...	5	c Ratcliffe, b May	...	...	...	12
G. Lyon, b Ward	...	12	b Ward	...	...	...	0
R. C. Mankowski, b Lindsay	...	9	run out	...	...	...	21
H. C. Bell, c Iredale, b Ward	...	34	st Walford, b May	...	...	...	8
E. Hopton, st Walford, b Lindsay	...	0	c May, b Ward	...	...	...	2
H. S. Mathews, b Dickin	...	15	run out	...	...	...	16
K. McDiarmid, b Ward	...	8	b Ward	...	...	...	0
W. W. Dobson, b Ward	...	5	c Dickin, b Ward	...	...	...	0
C. A. Cooke, c Stenhouse, b Ward	...	19	not out	...	...	...	19
J. Poore, c and b Ward	...	0	c Stuart, b Ward	...	...	...	9
E. F. Longcroft, not out	...	8	c Symons, b Stenhouse	...	...	...	8
Extras	...	8	Extras	...	...	...	8
Total ...	...	127	Total ..	...	...	...	116

				PAST.			
D. Lindsay, b Bell	...	...	7	c Poore, b Lyon	...	...	12
F. A. Ward, b Hopton	...	...	10	b Lyon	...	...	5
G. N. Dickin, c Lyon, b Bell	...	...	6	b Lawson	...	...	30
E. Walford, b Hopton	...	...	0	b Bell	...	...	26
V. Stenhouse (captain), c Lyon, b Bell	...	...	56	st Mathews, b McDiarmid	...	...	53
G. G. Symons, b Bell	...	...	5	l-b-w, b Mankowski	...	...	70
G. M. May, c and b Bell	...	...	16	c Mathews, b Bell	...	...	7
F. Iredale, b Bell	...	...	8	did not bat	...	...
R. Ratcliffe, l-b-w, b Hopton	...	...	12	l-b-w, b Hopton	...	...	8
E. Irwin, b Cooke	...	...	14	run out	...	...	0
R. Stuart, not out	...	...	0	c and b White	...	...	0
A. Lawson, b Cooke	...	...	2	not out	...	...	20
Extras	...	...	19	Extras	...	...	14
Total	...	...	155	Total	...	...	245

The following received their colours:—G. Lawson, captain; G. Lyon, E. Hopton, A. S. White, H. C. Bell, H. S. Mathews, R. C. Mankowski, C. A. Cooke, K. McDiarmid, J. Poore, W. W. Dobson.

The Second XI. have played eight matches. They both won and lost against Cirencester Phoenix and Siddington, and lost to Cirencester Second XI, Cricklade, and twice to Stratton.

The cricket intelligence is incomplete and the season is not concluded as we go to press: we will give the scores of the other matches, and also the batting and bowling averages, in our next issue.

LAWN TENNIS.

R.A.C. v. SWINDON.—Played at Swindon on June 11th. Teams.—R.A.C. : F. de la Gandara and G. S. West, H. S. Mathews and G. T. Locke, J. W. Addison and F. Storr. Swindon : R. M. Bentley Taylor and C. Wood, C. Stote and L. Reid, —, Sheepshanks and —, Rose.

F. de la Gandara and G. S. West

lost to R. M. Bentley Taylor and C. Wood 0—6 4—6

lost to C. Stote and L. Reid 3—6 5—7

lost to —, Sheepshanks and —, Rose 6—4 5—7 3—6

H. S. Mathews and G. T. Locke

lost to R. M. Bentley Taylor and C. Wood 5—7 2—6

beat C. Stote and L. Reid 6—3 0—6 6—3

lost to —, Sheepshanks and —, Rose 6—3 6—8 3—6

J. W. Addison and F. Storr

lost to R. M. Bentley Taylor and C. Wood 0—6 1—6

lost to C. Stote and L. Reid 0—6 3—6

lost to —, Sheepshanks and —, Rose 0—6 2—6

R.A.C. lost 8 matches to 1, 18 sets to 4, 120 games to 66.

R.A.C. v. R. J. MULLINGS'S VI.—Played at home, June 15th. Teams.—R.A.C. : F. C. McClellan and F. de la Gandara, H. S. Mathews and G. T. Locke, G. S. West and C. A. Cooke. Mr. R. J. Mullings's VI. : Revs. L. Dashwood and T. Cardus, R. W. Ellett and Dr. H. Marshall, R. J. Mullings and J. W. Addison.

F. C. McClellan and F. de la Gandara

lost to Revs. L. Dashwood and T. Cardus 2—6 3—6

beat R. W. Ellett and Dr. H. Marshall 6—2 6—3

beat R. J. Mullings and J. W. Addison 6—4 6—2

H. S. Mathews and G. T. Locke

lost to Revs. L. Dashwood and T. Cardus 1—6 4—6

beat R. W. Ellett and Dr. H. Marshall 9-7 10-8

beat R. J. Mullings and J. W. Addison 8-6 6-3

G. S. West and C. A. Cooke

lost to Revs. L. Dashwood and T. Cardus 1-6 0-6

lost to R. W. Ellett and Dr. H. Marshall 2-6 6-2 5-7

lost to R. J. Mullings and J. W. Addison 6-2 2-6 3-6

Lost 4 matches to 5, 10 sets to 10, 92 games to 100.

R.A.C. v. ROSS-HUME'S VI.—Played at home on June 16th. Teams.—R.A.C. : F. C. McClellan and F. de la Gandara, H. S. Mathews and G. T. Locke, G. S. West and J. W. Addison. Ross-Hume's VI. : Rev. L. Dashwood and Rev. Evans, Rev. Tyler and Rev. G. L. Amphlett, J. A. Ross-Hume and J. H. Milne Home.

F. C. McClellan and F. de la Gandara

lost to Rev. L. Dashwood and Rev. Evans 1-6 1-6

lost to Rev. Tyler and Rev. Amphlett 3-6 1-6

beat J. A. Ross-Hume and J. H. Milne Home 6-0 6-1

H. S. Mathews and G. T. Locke

lost to Rev. L. Dashwood and Rev. Evans 3-6 2-6

lost to Rev. Tyler and Rev. Amphlett 6-4 1-6 4-6

beat J. A. Ross-Hume and J. H. Milne Home 6-3 6-2

G. S. West and J. W. Addison

lost to Rev. L. Dashwood and Rev. Evans 3-6 0-6

lost to Rev. Tyler and Rev. Amphlett 2-6 3-6

lost to J. A. Ross-Hume and J. H. Milne Home 3-6 4-6

Result : Lost, 2 matches to 7.

R.A.C. v. EAST GLOUCESTERSHIRE.—Played at home on June 22nd. Teams.—R.A.C. : F. de la Gandara and G. S. West, H. S. Mathews and G. T. Locke, F. W. Addison and F. Storr. East Gloucestershire : R. C. West and A. W. R. Cheales, Dr. R. Armitage and S. H. Green, O. R. Bagnall and H. D. Robertson.

F. de la Gandara and G. S. West

lost to R. C. West and A. W. R. Cheales 2-6 1-6

lost to Dr. R. Armitage and S. H. Green 4-6 7-5 4-6

beat O. R. Bagnall and H. D. Robertson 6-2 6-3

H. S. Mathews and G. T. Locke

lost to R. C. West and A. W. R. Cheales 6-2 2-6 4-6

beat Dr. R. Armitage and S. H. Green 6-2 6-2

beat O. R. Bagnall and H. D. Robertson 6-2 6-2

F. W. Addison and F. Storr

lost to R. C. West and A. W. R. Cheales 1-6 1-6

lost to Dr. R. Armitage and S. H. Green 3-6 6-8

lost to O. R. Bagnall and H. D. Robertson 3-6 4-6

Result : R.A.C. lost, 3 matches to 6.

R.A.C. v. EAST GLOUCESTERSHIRE.—Played at Cheltenham on July 2nd. Teams.—R.A.C. : H. S. Mathews and G. T. Locke, G. S. West and F. C. McClellan, H. H. Beardsley and G. Stoddart. East Gloucestershire : R. C. West and A. R. Cheales, Dr. Armitage and E. Raynor, S. H. Green and O. R. Bagnall.

H. S. Mathews and G. T. Locke

lost to R. C. West and A. R. Cheales 1-6 3-6

lost to Dr. Armitage and E. Raynor 2-6 6-3 3-6

beat S. H. Green and O. R. Bagnall 6-3 6-1

G. S. West and F. C. McClellan

lost to R. C. West and A. R. Cheales 0-6 2-6

lost to Dr. Armitage and E. Raynor 5-6 1-6

lost to S. H. Green and O. R. Bagnall 3-6 6-4 3-6

H. H. Beardsley and G. Stoddart

lost to R. C. West and A. R. Cheales 1-6 1-6

lost to Dr. Armitage and E. Raynor 0-6 2-6

lost to S. H. Green and O. R. Bagnall 6-3 4-6 1-6

Result : R.A.C. lost, 1 match to 8.

R.A.C. v. SWINDON.—Played at home on July 9th. Teams.—R.A.C. : H. S. Mathews and G. T. Locke, F. de la Gandara and F. C. McClellan, F. Storr and G. S. West. Swindon : C. Stote and L. Reid, G. H. Pearson and C. E. Spurgeon, R. S. Garratt and V. Bayley.

H. S. Mathews and G. T. Locke

beat C. Stote and L. Reid 6—3 6—1

beat G. H. Pearson and C. E. Spurgeon 6—0 6—0

beat R. S. Garratt and V. Bayley 6—3 6—4

F. de la Gandara and F. C. McClellan

beat C. Stote and L. Reid 4—6 7—5 6—1

beat G. H. Pearson and C. E. Spurgeon 6—3 6—0

beat R. S. Garratt and V. Bayley 6—2 6—4

F. Storr and G. S. West

lost to C. Stote and L. Reid 9—7 2—6 4—6

beat G. H. Pearson and C. E. Spurgeon 6—2 7—5

beat R. S. Garratt and V. Bayley 6—4 6—2

Result : Won, 8 matches to 1, 17 sets to 3.

R.A.C. PAST v. PRESENT.—Teams.—Present : H. S. Mathews and G. T. Locke, F. de la Gandara and F. C. McClellan, F. Storr and G. S. West. Past : F. St. B. Haskett-Smith and M. Morris, G. N. Dickin and F. A. Ward, J. A. Ross-Hume and K. Swanwick.

H. S. Mathews and G. T. Locke

lost to F. St. B. Haskett-Smith and M. Morris 3—6 3—6

lost to G. N. Dickin and F. A. Ward 3—6 6—8

beat J. A. Ross-Hume and K. Swanwick 6—3 6—3

F. de la Gandara and F. C. McClellan

lost to F. St. B. Haskett-Smith and M. Morris 4—6 6—8

lost to G. N. Dickin and F. A. Ward 6—3 0—6 3—6

beat J. A. Ross-Hume and K. Swanwick 6—2 6—1

F. Storr and G. S. West

lost to F. St. B. Haskett-Smith and M. Morris 6—4 3—6 3—6

lost to G. N. Dickin and F. A. Ward 7—9 0—6

beat J. A. Ross-Hume and K. Swanwick 6—4 6—4

Past won ; 6 matches to 3, 12 sets to 8, 103 games to 89.

Special thanks are due to Mr. and Mrs. Swanwick for getting together the Past team, and for entertaining not only the teams but a large number of visitors at the match.

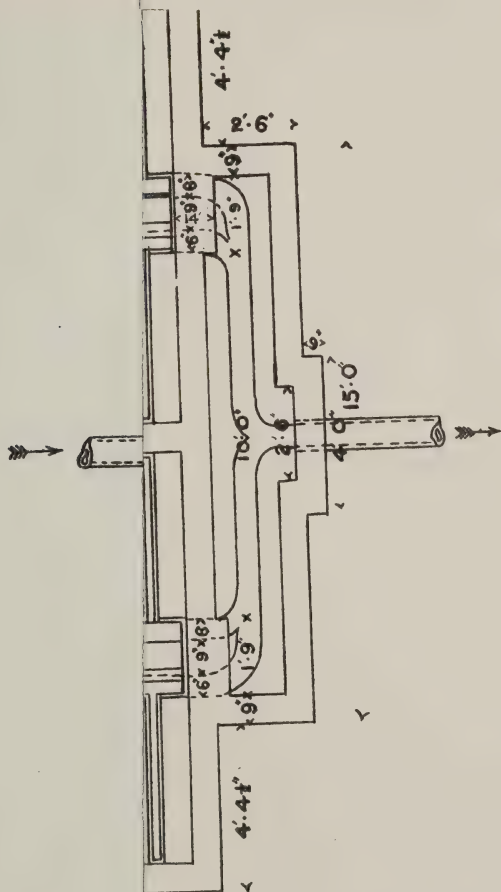
The Tennis VI. consisted of H. S. Mathews (captain), Prof. G. T. Locke, Prof. F. C. McClellan, Prof. G. S. West, F. de la Gandara, and F. Storr.

REVIEW.

(RUSSIAN JOURNAL OF EXPERIMENTAL AGRICULTURE.)

RUSSISCHES JOURNAL FÜR EXPERIMENTALLE LANDWIRTSCHAFT, MIT WIEDERGABE DES INHALTS DER ORIGINAL ARBEITEN IN DEUTSCHE SPRACHE. St. Petersburg, Forstinstitut.

This journal was started by the Editor, Professor P. S. Kossowitsch, in 1890. It contains original articles and also abstracts of papers published in foreign journals, all these being printed in Russian. This language would make the journal of little avail outside its own country, but its use is very greatly increased by printing after the original papers a fairly full abstract of them in German, thus making them available to a very much wider circle. There are twenty original papers in the Journal for 1903, including two by the talented Editor, Professor Kossowitsch—one on alkali soils and one on the development of roots in relation to the temperature of the soil during the first period of growth of the plant. The Journal is a valuable one to the Russian student of agriculture.



FOR P

RATE SQ. YD. PER DAY.

— D. —



— PLAN. —

FOR POPULATION OF 100 PERSONS

RATE OF FILTRATION THROUGH FINAL FILTERS=100 GALLS PER SQ.YD. PER DAY.

THE PURIFICATION OF SEWAGE.

1. The number of Sanitary Authorities requiring the crude sewage of small villages and towns to be properly purified before being passed into streams or rivers is rapidly increasing.

2. During the last few years I have been frequently asked to devise a process for the purification of crude sewage from small villages, &c., which would give satisfactory results and not be too costly. The following notes are taken from a series of experiments on the purification of crude sewage which I have been making for the Worcestershire County Council during the last four years.

3. Before we can devise a scheme for the purification of sewage it will be necessary for us to consider the composition, both chemical and bacteriological, and properties of that substance, and the manner in which it is naturally purified.

4. We will take it for granted that we have to deal with a sewage which is purely domestic and therefore quite free from chemical refuse of all kinds, otherwise the problem becomes a very complicated one. Domestic sewage free from surface water will contain the solid and liquid excretions of man and animals mixed with much water, the waste liquids and solids from the kitchens, and the domestic "slops." It will vary greatly in composition when examined at different times of the day, and will be more concentrated in a district not possessing a plentiful water supply. To convey some idea of the chemical composition of sewage, a drinking water, and a river water, the following table has been prepared.

In parts per 100,000.	Crude Sewage, Malvern. (Average.)	Cirencester Tap Water.	River Severn Water.
Solids in Suspension	43·2	None	Trace
" " Solution	78·1	33·7	32·0
Chlorine	12·2	1·4	4·4
Free and Saline Ammonia as Nitrogen	11·8	None	0·006
Albuminoid Ammonia as Nitrogen	1·2	None to trace	0·01
Nitrogen in Solids in Suspension	1·9	None	Trace
Oxygen absorbed in 4 hours at 60° F.	6·5	None	0·2
Nitrogen in Nitrates	None	7·	None
" " Nitrites	Dark Yellow	None	None
Appearance	Not very bad	Clear and bright	Opalescent
Odour	Alkaline	None	None
Reaction		Neutral	Neutral

5. The bacterial composition of crude sewage varies greatly. A cubic centimeter of the liquid may contain at one moment many thousands of bacteria, whilst shortly afterwards the numbers may amount to millions.

These bacteria play a very important part in the *natural* purification of sewage, and it is to this natural process of purification I wish to call special attention, as I am of opinion it is by far the best process for the satisfactory purification of sewage (if free from chemicals) now known.

These minute organisms have been carefully studied with a view to determine in what way they react upon the sewage, and how their purifying action on it may be best utilised.

6. The bacteria found in sewage may be divided up into the following groups :—

ANAEROBIC. Those which will not develop in the presence of air (oxygen).

AEROBIC. Those which require the oxygen of the atmosphere for their development.

FACULTATIVE ANAEROBIC } Those which can develop in the
AEROBIC } absence or presence of air.

They are injuriously affected by the action of light, and require for their active growth a certain amount of warmth, moisture and food. In sewage their food is derived from the organic and mineral matters contained therein, whilst the temperature necessary for active growth is derived in part from the surroundings and in part from the chemical reactions taking place in the fermenting sewage.

7. If crude sewage is kept very cold, little or no change will take place in its chemical and bacteriological composition. With a rise of temperature there will be an increase in the chemical and bacteriological changes; these changes increase up to a certain point, when the fermentation of the sewage attains a maximum. If above this point the temperature is still further increased by artificial means, fermentation will be at first retarded, and then, as the temperature is further raised, quite stopped. If the temperature is raised to the boiling point of water, fermentation will be destroyed, and simply cooling the sewage will not restore it. A sewage so treated is said to be sterile, but will ferment again if mixed with crude sewage or left in contact with the atmosphere.

8. The Anaerobic and Facultative Anaerobic Bacteria present in crude sewage have the important property of being able to attack and liquefy the solid organic matter (albuminoid and vegetable matter) of sewage if the atmosphere is carefully excluded. These organisms therefore have the important property of dissolving the solid organic matter of sewage, and converting it in part into gases and in part into substances which are dissolved by the water of the sewage. As the oxygen of the atmosphere slowly diffuses into fermenting sewage the Anaerobic Organisms become less, but the Aerobic and Facultative Aerobic become more, active. The organic and nitrogenous substances in solution in the crude sewage are attacked and converted into

ammonia, nitrites, carbonic acid gas, marsh gas, nitrogen, &c. The final stage in the fermentation or natural purification of the sewage is reached when there is complete aeration; the nitrites being oxidised to nitrates and the organic matter broken up into inert substances, such as carbonic acid gas and water.

9. Such, shortly, are the chief changes produced by natural fermentation or purification of crude sewage. By these changes the objectionable substances present in the sewage are converted into inert bodies and a liquid is obtained from which most of the objectionable properties of crude sewage are removed; the newly formed liquid should possess no unpleasant odour, should not ferment any further, and may support fish life. All the above changes are not entirely due to the action of bacteria, for in these, more highly organised forms of animal and vegetable life, play a part.

10. Crude sewage, therefore, if kept warm and out of contact with the atmosphere, becomes almost free from organic solids in suspension; if this partly purified sewage is then brought into contact with the atmosphere a further change takes place, the organic matter in solution is further acted upon, inert bodies are formed, and a high standard of purification may be arrived at. The rapidity of this purification will, to a considerable extent, depend upon the temperature of the sewage and the means employed for collecting together the organisms responsible for this work and preventing them from being washed away.

11. To obtain all the above-mentioned conditions for the bacteriological (natural) purification of crude sewage a number of "systems" have been devised. Three experimental systems were selected for the County experiments. These were laid down, side by side, and supplied with flowing sewage from the main sewer as it enters the Shuttlefast Sewage Farm, Malvern Wells. Each system was constructed so as to treat 1,000 gallons of crude sewage per day of 24 hours. They frequently treated very much larger quantities.

12. I will only describe the bacterial system which gave the best results, and I may add that it is a system which has been used in practice successfully.

The "system" will be described as System D, and figure D shews clearly the experimental apparatus.

13. This system consists of a liquefying tank (closed septic) for Anaerobic treatment, and bacterial beds (filters) for the final oxidation or the Aerobic treatment.

14. The crude sewage passes from the main sewer into the system through a V shaped slot, designed to allow a flow of 1,000 gallons of crude sewage every 24 hours to be treated by the system. On several occasions the flow of crude sewage was, however, considerably greater than this. The sewage, after passing through the slot, enters the mixing chamber, which contains upright slate baffles built into the brickwork, and so constructed as to offer as much resistance as possible to the flow of solid matter in the sewage so as to disintegrate it, thereby ensuring more rapid liquefaction in the liquefying tank subsequently described.

15. The well mixed and disintegrated sewage then flows into the catch pit, and deposits there most of the heavy mineral matter (such as sand and gravel), which would in time, if allowed to pass on, choke up the liquefying tank. The catch pit is cleared out by means of a scoop from time to time. In the case of the Malvern catch pits there was so little mineral matter that they were in no need of being cleared out, not even after sewage had been passing through them for two years. In the catch pit a considerable amount of fermentation takes place.

16. The liquids and the suspended solids of the sewage then pass into the liquefying tank* by a *submerged inlet*. The tank is completely closed up with the exception of the submerged inlet and outlet, so as to prevent the atmosphere from interfering with the action of the liquefying (Anaerobic) organisms present in the sewage, which liquefy or dissolve the solid organic matter therein. Great changes take place in this tank; nearly the whole of the organic solids of the sewage are liquefied or dissolved, while at the same time other organic bodies are being acted upon in such a manner as to prepare them for the next step in the purification. The top of the tank is fitted with a manhole and cover, through which the unliquefiable solids of the sewage carried past the catch pit (fine sand, pieces of wool, wax matches, candle wax, grease, hair, cloth, wool, etc.) are pumped out when they become too voluminous. At Malvern it was not necessary to empty this tank, although sewage had been passed through for two years. The liquid passes out of the tank through a submerged outlet, and contains only a very small quantity of solid matter in suspension. This solid matter is almost entirely composed of masses of bacteria, mixed with partly liquefied matter and some vegetable and animal organisms (worms) more highly organised than bacteria. These solids rarely amount to more than a grain per gallon of liquid. There is, however, one point to be observed about them; they are very apt, unless steps are taken to prevent it, to choke up the bacterial beds (filters) upon which they are next poured.

17. The liquid, on passing from the liquefying tank, falls over a small weir, and is then divided into two equal streams. One half of the liquid is made to flow to the right and the other half to the left, through open pipes into iron tumblers (the same length as the bacterial bed, and holding on either side a volume of liquid equal to about four gallons). These tumblers work automatically and give alternate deliveries of the liquid into zinc troughs pierced with numerous small perforations through which the liquid passes, and is distributed all over the surface of the solid materials with which the four bacterial beds (filters) are filled. It should be noticed that the liquid, on leaving the liquefying tank, is always brought into intimate contact with as much air as possible so that aeration is encouraged.

* The liquefying tank in this experiment was closed, and the whole apparatus was never objectionable, even in hot weather. The tank could be left open, when a thick scum will form and completely prevent air passing into the liquid.

18. The next step in the process of purification is very important, and one in which the partly purified sewage is brought into intimate contact with the atmosphere and with the bacteria which aid in oxidation and final purification. This object is best arrived at by placing in the bacterial beds (filters) solids of varying size and composition, such as, for example :—Coke, coal, broken brick, local stone (if not too soft), hard burnt clinker, hard burnt ballast, or gravel.

19. At Malvern the system has attached, four bacterial beds (filters) of the same size, and each contained a different solid material. The material giving the best results was coke; this is probably due to the fact that coke is capable of holding back in its numerous chinks and crevices the oxidising bacteria. The beds were filled as follows :—

	Size. "Fine" on Top of Bed.	Size. "Medium" in between.	Size. "Rough" at Bottom of Bed.
Coke-beds—	To pass $\frac{1}{4}$ -inch sieve and rejected by $\frac{1}{16}$ -inch. Thickness 3' 3".	To pass $\frac{5}{8}$ -inch sieve and rejected by $\frac{1}{4}$ -inch. Thickness 6".	To pass $1\frac{3}{4}$ -inch sieve and rejected by $\frac{5}{8}$ -inch. Thickness 9".

The coke used was well washed and graded before being placed in the beds, and each layer of material was carefully and evenly spread to its proper thickness.

20. The liquid having passed through these beds is the product of the treatment, and is known as the final effluent.

21. The total fall from the upper end of the mixing chamber to the outlet from the lower side of the inspection chamber is seven feet.

22. The following table shews the percentage purification of the "organic nitrogen" and "oxygen absorption" of the sewage when passing through the system :—

System D.				Oxygen Absorption.	Organic Nitrogen.	Material.
				Percentage purification.	Percentage purification.	
Tank ...	...	...	...	27·7	71·1	
Bacterial Bed No. 1	...	...	...	82·2	94·0	Coke
" "	2	...	...	71·2	89·6	Coal
" "	3	...	...	70·0	89·0	Brick
" "	4	...	...	62·7	86·7	Granite

REMARKS ON THE WORKING OF SYSTEM D.

23. During the two years the experiments were made the liquefying tank never required clearing out. The amount of sludge in the tank at the end of that time was not large. The small quantity of solids in suspension in the effluent from the tank has a tendency to choke up the surface of the coke beds and to cause "ponding." To remove this difficulty the surface of the beds was at first raked over

several times. The ponding appeared to be due, to a considerable extent, to the formation of a vegetable growth in the beds which prevented the effluent from the tank passing through readily. This growth gives way to a development of small animals (worms, infusoria, etc.) which probably consumed the vegetable matter, thus more or less clearing up the beds and allowing the liquid to pass through more readily. The worms, etc., finally gave way to bacteria, and then the beds resumed their normal working. This went on for some time, but subsequently the vegetable growth again appeared and caused ponding. The ponding difficulty can be overcome by duplicating the beds, so that when a bed shows signs of ponding it should be given a rest and the other bed used. Raking over the beds cannot be recommended—it has a tendency to disintegrate the material, rendering it too fine in texture. If the ponding is very bad it would be best to remove the surface and renew it with fresh material.

24. Gold fish were not injured when placed in the final effluent for several months, and it was found that if the effluent was passed into a small pool, trout, which are very sensitive to crude sewage, were kept alive for one year, when the experiment ceased.

The fish test (using trout and not gold fish) is a very sensitive one, and may be employed to determine whether the apparatus is in good working order or not. Before fish can be experimented upon in this way it is necessary to obtain a license from the Home Secretary!

A simple test to take the place of the above is to collect about two pints of the effluent in a clean bottle and keep it in a warm room for 14 days. A satisfactory effluent should not ferment and smell bad, or become turbid during that time.

CECIL DUNCAN, F.I.C.

FARMING IN COLORADO, U.S. AMERICA.

Thirty years ago, when only the choice spots along the rivers and creeks had been taken up by settlers, and the rest of the country was public land owned by the United States Government, there was comparatively little arable farming in Colorado. Grazing cattle on the prairies was the most profitable occupation, as the cattle were left out winter and summer, and the expense of attending to them was small. Those owning farms would probably grow a little hay for the use of their saddle horses and milk cows during the winter. An old settler about that period told me that the less farming (meaning agricultural farming) you did the better you were off, and I most certainly think he was right. Farming in those days meant employing men at high wages and putting a lot of expense into private irrigating ditches which were perpetually out of order, being washed away by short sudden floods during the summer months. Sometimes dry creeks and arroyas would become raging torrents and carry away the irrigating aqueducts, although there might have been no rain at all on the farm that was needing the irrigation.

In these days an entire change has taken place in farming methods. Those who own cattle have found it necessary to improve the breed and take better care of them. The prairie grass is not so abundant as formerly ; cattle have to be put into enclosures and provided for during the winter months, and consequently fodder crops have to be grown.

Irrigation has been very much developed, and farmers have combined and built large canals, which are strongly constructed and well kept up. Those owning land under these canals have to possess a certain number of shares in them according to the number of acres they own, and then an assessment is made on these shares for maintenance. Irrigation at best is an expensive business, and I do not think that crops grown under that system can ever compete in the public market with crops grown in States where there is a regular rain-fall. On the other hand, in a State like Colorado, where there is not sufficient rain-fall to grow crops, there is of necessity a great deal of land that cannot be brought under irrigation. This is not farmed, but simply left open for summer grazing ; so the man who owns cattle can afford to pay more for his winter feed, as his cattle live during a large portion of the year on the public lands. My opinion is that the profitable way in a State where irrigation is necessary is to grow crops to be fed on the spot, and to get your money out of the cattle that have been so fed, and not to attempt to put your produce on the public markets in competition with what has been grown under a natural rain-fall. One point in favour of irrigation is that the muddy water from the rivers acts as a strong fertilizer, and during the summer months the rivers generally are muddy.

Those who own cattle now do not make the large profits of former years, and the old-time cattle kings are a thing of the past. These days a cattleman sends out his riders in September in conjunction with the riders of his neighbours, and they collect all the cattle running loose in that district. This system of collecting, or, as we call it, rounding up, will probably take two or three weeks, the men collecting the cattle within a certain area of country each day. The cattle so collected are driven into large pastures, enclosed by a barbed wire fence, which have been kept free from cattle during the summer and where the grass is fresh and abundant. If the severe winter weather does not begin early these pastures will provide sufficient feed till about the end of the year, then certain classes will be taken into the fields and feeding lots and have hay and fodder hauled out to them in waggons. This hay is often just thrown from the waggons on to the ground in long lines, so as to give the cattle plenty of room to feed, and this system works well in a country where the ground is generally dry. Some of the strong young steers and heifers are left in the grass pastures all winter, and about the first of May everything is again turned on to the prairie. This gives a rough general idea of the way in which the ordinary cattle-man of Colorado conducts his business in these days.

JAMES LIVESEY.

EXPERIMENTS ON PASTURE, 1904.

FIELD No. 13.

Experiments were continued on the 20 plots, each $\frac{1}{20}$ acre, used the last twelve years or more (see *Agricultural Students' Gazette*, April, 1889, August, 1889 and 1890, December, 1891, August, 1892, 1893, and 1894, July, 1895, and August, Parts 1896 to 1903), the manures applied to each plot being the same in kind and in amount as in the previous years.

The manures and their amounts per acre were as follows:—

NO. OF PLOT.				AMOUNT PER ACRE.	
A3.	Rape meal	...	...	5	cwt.
A2.	Thomas' basic slag	...	...	10	"
A1.	Farm-yard manure	...	...	12	tons.
1.	Sodium nitrate	...	...	2 $\frac{1}{2}$	cwt.
2.	Kainite	...	...	5	"
3.	Equalised Peruvian guano	...	...	5	"
4.	Superphosphate	}	...	5	"
	Ammonium sulphate		...	2	"
5.	Kainite	}	...	5	"
	Superphosphate		...	5	"
6.	Kainite	}	...	5	"
	Superphosphate		...	5	"
	Sodium nitrate		...	2 $\frac{1}{2}$	"
7.	Unmanured				
8.	Kainite	}	...	5	"
	Superphosphate		...	5	"
	Ammonium sulphate		...	2	"
9.	Ammonium sulphate	...	...	2	"
10.	Kainite	}	...	5	"
	Sodium nitrate		...	2 $\frac{1}{2}$	"
11.	Kainite	}	...	5	"
	Ammonium sulphate		...	2	"
12.	Equalised Peruvian guano	...	...	5	"
13.	Superphosphate	...	...	5	"
14.	Superphosphate	}	...	5	"
	Sodium nitrate		...	2 $\frac{1}{2}$	"
B1.	Farm-yard manure	...	...	12	tons.
B2.	Thomas' basic slag	...	...	10	cwt.
B3.	Rape meal	...	...	5	"

This is the seventeenth year in succession for the application of the same manure to plots 1—14, the sixteenth year of the farm-yard manure plots, and the thirteenth year of the application of Thomas' basic slag and rape meal.

The farm-yard manure was applied on February 10, 1904; the

	Rain. Inches.	Rainy days.	Average Rainfall, 34 years.	Mean temp. F°.	Days of frost on grass.
January ...	3.48	23	2.66	38°4	24
February ...	4.70	23	2.32	37°3	20
March ...	1.34	15	1.97	39°5	18
April ...	1.32	13	1.92	46°6	4
May ...	2.86	19	2.16	50°3	5
June to 13th	.46	3			
	14.16	96			

The rainfall after cutting the grass until the hay was carried was, June 14th, .42; 15th, .05; and 17th, .08 inches.

The plot which receives kainite alone showed less growth than the unmanured plot. Nitrate of soda alone gave an increase of $3\frac{1}{2}$ cwt. of hay only, sulphate of ammonia of $11\frac{5}{8}$ cwt.

The increase on the plots to which basic slag is applied was fair, but the increase derived from superphosphate alone was poor. The phosphatic manures encourage the clovers. Superphosphate and kainite together gave a satisfactory increase of $9\frac{5}{8}$ cwt. of hay, and this crop was of good quality.

Guano gave an increase of about 8 cwt. of hay, and the quality of the hay on these plots was the best.

Kainite and nitrate of soda did much better than either separately, and kainite and ammonium sulphate even better.

The highest yield was given by farm-yard manure: a similar result occurred last year: the yield is nearly double that of the unmanured. The next in order of yield are the plots receiving mixed cinereals (superphosphate and kainite) with nitrate of soda, and mixed cinereals with ammonium sulphate; followed closely by superphosphate and ammonium sulphate, and superphosphate and nitrate of soda. All these gave 37 cwt. or more of hay per acre, 15 to 17 cwt. more than the yield of the unmanured plot.

The grass on the plot receiving cinereals and ammonium salts was of better quality than that receiving cinereals and nitrate of soda. This year, ammonium sulphate in conjunction with other mineral manures gave generally rather higher results than sodium nitrate under like conditions, and when these nitrogenous manures were used alone the ammonia salt gave much better results than the nitrate.

The average yield per acre of all the plots was $30\frac{1}{4}$ cwts., nearly the same as that of last year and nearly double that of 1901. The yield of the unmanured and less highly manured plots was often larger than that of last year, but that of the more highly manured plots did not reach last year's produce.

The grass was cut earlier in the season than usual, and during the last ten days before cutting it made comparatively little progress owing to a spell of cold E. and N.E. winds.

After hay harvest the whole field was grazed with cows and sheep.

E. K.

THE DANGERS OF AN IMPURE MILK SUPPLY,

And some Suggested Alterations in the Legislative Provisions for the Control of the Milk Supply.

By PROF. H. A. WOODRUFF, F.R.C.V.S.

[An Abstract of a paper read before the Conference of Veterinary Inspectors at the Congress of The Sanitary Institute, held at Glasgow, July 29th, 1904.]

There is little need to demonstrate the importance of a supply of pure milk; and it is a matter of congratulation that a great deal of attention has been recently paid to this subject both by the medical and veterinary professions, and also happily by many of the lay public.

Apart from the practically universal use of milk in ordinary diet, when we consider that milk is especially (and unfortunately in an increasing degree) the diet of a large number of infants under one year old, and also of invalids, in which cases the natural protective forces of the body are weak; and that while its power for good, if pure, is great, its power for evil, if impure, is equally great; it is difficult to exaggerate the importance of a pure supply.

But not only are we disposed to strive for a pure milk supply by these general considerations, but also because there is unfortunately only too much evidence to show that infected milk has been responsible for many serious outbreaks of disease in the past, among the more important being typhoid, diphtheria, scarlatina, epidemic sore throat, diarrhoea, and not least tuberculosis.¹ Besides these recorded cases there can be no doubt that impure milk has caused innumerable cases of disease in which its responsibility was not recognised, and above all because it is a very potent factor in respect to the extremely serious infantile death-rate, a rate which remains stationary at a high figure, notwithstanding the progressive fall of the rate at all other ages.

Practically speaking, almost all the ill-effects that milk can produce are due to the presence in it of bacteria, and it is because milk is so suitable for their growth and multiplication that infection by means of it is so common. Its composition, which is exactly suited to bacterial requirements, its neutral re-action, the temperature at which it is drawn, and the conditions of its production and preparation all unite to favour infection and to make the prevention of contamination a very difficult matter. Then, too, milk is largely consumed in the uncooked state, such as is the case with no other animal food, and so the sterilising effect of heat is not made use of.

The sources of danger may be divided into (a) those appertaining to the cow, and (b) other sources.

The Cow as a source of danger.—There are certain diseases to which the cow is subject which may also affect human beings, and of these the more important are the following.

¹ For details see "Bacteriology of Milk," by Swithinbank and Newman. The writer wishes to acknowledge here the very valuable assistance he has derived from this work, and to express his indebtedness.

Tuberculosis.—The prevalence of tuberculosis among cattle is well known, and from their conditions of life milch cattle are the commonest victims of the disease, probably 30 per cent. being affected to a greater or lesser extent. The important question as to whether bovine tuberculosis is the same disease as tuberculosis of man, and whether the infection can be conveyed from the cow to the human subject, has received much attention of late, and it is satisfactory to those who have throughout urged the necessity for continued precautions to guard against the danger of tuberculous meat and milk, that their views have been endorsed in the interim report of the Royal Commission. In that report the Commissioners state that they have arrived at the conclusion that “tubercle of human origin can give rise in the bovine animal to tuberculosis *identical* with ordinary bovine tuberculosis.” “We have so far failed to distinguish one from the other,” and further, “Our results seem to show quite clearly that it would be most unwise to frame or modify legislative measures in accordance with the view that human and bovine tubercle bacilli are specifically different from each other.” These statements leave no room for doubt of the identity of bovine and human tuberculosis.

But there is not wanting clinical evidence, and although primary infection with tuberculosis most commonly takes place by way of the respiratory tract, a primary intestinal infection is not rare, as proved by post-mortem examinations on tuberculous children. Allowing then the possibility of infection by means of milk, what is the degree of danger?

It is generally agreed that only those cows with tuberculosis of the udder are likely to give infected milk, and McFadyean on this point says, “My own experience leads me to think that about 2 per cent. of the cows in the milking herds of this country are affected with tuberculosis of the udder.” This then represents the possible risk from milk, but this risk is by no means uniform all over the country. In London, during thirteen quarterly inspections from 1899 to 1903, the number of cows examined was never less than 3,900, and out of these the number with “actual and suspected tuberculous udders” was on the average only 0·2 per cent.¹ In Manchester in 1901 of 1,839 cows (in town byres) examined, only 1 was found to have tuberculosis of the udder (0·054 per cent.) whilst out of 1,441 cows in country cowsheds, whose milk was consumed in Manchester, 15 were found with tuberculous udders (1·04 per cent.).² These reports speak volumes for the success of efficient inspection and supervision.

Foot and Mouth Disease.—This disease is fortunately unlikely to get a permanent foothold in this country, but there is always a danger of infection being introduced from abroad in hides, wool, straw, etc. Many cases of this disease in man have been recorded from time to

¹ From Results of Examinations by W. F. Shaw, F.R.C.V.S., supplied to Dr. Shirley Murphy, M.O.H. to the London County Council.

² Report on Health of City of Manchester, 1901, pp. 238-248.

time, and there is little doubt that the infection was derived in the majority of cases from the milk of diseased cows.¹

Another disease of which milch cows are very commonly the subjects must also be alluded to, namely, *Mastitis*. An inflammatory condition of the udder is so common as to be well known to every dairyman, and it is usually put down to a chill, or a blow, or to careless milking. In a recent investigation,² Henderson found three main types, viz.: tuberculous, purulent, and hæmorrhagic, with streptococci as the predominating organisms in the purulent form, and a bacillus of the *B. coli* group as the prevailing one in the hæmorrhagic type. The importance of a correct knowledge of this condition lies in the fact that cows with inflammation of the udder have been held responsible for both epidemic sore throat and epidemic diarrhœa in the human subject. It is now generally admitted that epidemic diarrhœa—a specific bacterial disease affecting chiefly very young children—is most frequently caused by the consumption of infected milk. Several organisms have been held responsible for the disease, but chiefly: (a) *streptococci*, (b) the *bacillus enteriditis sporogenes* (Klein), and (c) organisms of the *bacillus coli* type (Delépine), two of these being among those described as prevailing in mastitis. It must be noted that the great majority of the deaths from this cause occur in children artificially fed.

How important this is, is only realised when we remember that this infantile rate has remained almost stationary at a seriously high level for many years, and, in fact, reached the highest point, since 1850, in 1899, with 163 deaths per 1,000 births.

Milk may be affected with the organisms causing epidemic diarrhœa in several ways: at the farm, usually by fæcal contamination; or in the ordinary sporadic cases of diarrhœa, by infection at the home with air-borne organisms (Newsholme).

Of sore throat epidemics there have been several for which no other cause but milk could be assigned.³ Two recent outbreaks near London the one at Woking in October 1903,⁴ the other at Finchley in January, 1904,⁵ were attributed by the respective medical officers of health to cows affected with mastitis, apparently of the ordinary purulent type. It appears probable that climatic conditions have an important influence in determining an outbreak, and no doubt the degree or amount of infection greatly varies, i.e., a large number of the causal *streptococci* may be necessary to infect. Then, too, it is quite possible that all cases of mastitis are not due to the organisms before mentioned, but that occasionally an inflammation of the udder, indistinguishable clinically, but due to a pathogenic germ, causes infection of the milk

¹ McFadyean, in Allbutt's System of Medicine, pp. 691 and 692.

² A Contribution to the Study of Mastitis in Cows, *Journal of Comparative Pathology*, Vol. XVII., Part I.

³ "Bacteriology of Milk," by Swithinbank and Newman, p. 352-361.

⁴ J. Wortley Axe, *Veterinary Record*, March 12th, 1904, p. 575-77.

⁵ Professor H. Kenwood, in *British Medical Journal*, March 12th, 1904, p. 603.

and so produces this condition of sore throat in the human subject.

There are two other diseases in which cow's milk has often been the medium of infection, and for which the cow has been held by many to be directly responsible, these are Diphtheria and Scarlatina.

Diphtheria.—It is not difficult to understand how milk may be the medium of infection by being itself infected with diphtheria from the human source, especially when it is remembered that the diphtheria bacillus is wisely distributed in nature, and that it has now been shown that in apparently healthy persons who have not suffered from diphtheria the bacillus diphtheriæ may be present. The more important question is whether the cow may be the subject of this disease and so a source of infection. This is uncertain, but the majority of bacteriologists agree with Crookshank that "there is not sufficient evidence to justify the conclusion that the infectivity of the milk in epidemics of milk diphtheria has been proved to be due to a morbid condition of the cow."

Scarlatina.—As with diphtheria, so with this disease, there is the possibility of accidental contamination of the milk by contagium from a human source, either by the milker or by some person handling the milk before it reaches the consumer, and in the majority of cases of infection by means of milk this method is sufficient to account for it. But it is the firm opinion of many medical men that infection can come directly from the cow, herself the subject of the disease. In an investigation made by Power and Wynter Blyth, at the time of the historic Hendon outbreak in 1885, they were of opinion that the outbreak was traceable to a certain dairy at Hendon, and to certain cows in that dairy which were suffering from an ulcerative eruption on the udder and teats. Klein, after bacteriological investigation, expressed the opinion that the disease of the cows was the analogue of human scarlet fever. Other observers have come to different conclusions, and it is hardly necessary to state that the general view of the veterinary profession is that the cow is not susceptible to scarlet fever, and cannot be looked upon as the source of the infection when milk is proved to have caused an epidemic.

Sources of Infection other than the Cow.—Important as are the diseases transmissible from the cow, milk is much more commonly infected after leaving the udder, and the occasions for contaminations are many.

Infection during milking.—This arises from a dirty condition of the udder and teats, from dirt and hairs from the belly and tail of the cow, from dust arising from fodder and litter in the byre, or from want of cleanliness on the part of the milker. Then, too, the first part of the milk is invariably richer in bacteria than the latter portions, due to the multiplication and growth of germs in the milk left adhering to the teat and remaining in the teat canal, after the previous milking.

During handling and preparation.—The various utensils used for straining and containing the milk—sieves, pails, cloths, etc.—are by no means always thoroughly sterilised. In many cases, indeed, where washing alone (without the aid of heat) is relied on to cleanse the

milking vessels, the water used is far from pure. Again, by mixing the milk of all cows in the byre, the contamination of the milk of one is the contamination of all.

During transit.—Much of the milk consumed in large towns is produced in the country, and has to be conveyed long distances by train. The time it is kept on country stations, and in transit, often in closed or ill-ventilated vans, and almost always without refrigerators, has a marked influence on the growth and number of bacteria. Again, the churns are frequently not sealed, and both exposure and adulteration are quite possible and undoubtedly occur.

At the town dairy and during delivery.—The shops in which milk is sold may be generally classified as (a) those for the sale of dairy produce only, and (b) those in which milk is one of a great variety of articles sold. In the former the chief methods of contamination of the milk are: (1) its exposure in a large vessel on the counter, (2) the use of a special dipping-can for measuring out the milk, (3) the presence, especially in the summer, of large numbers of flies. In the latter class of shops the chances of infection are infinitely greater and too many to be enumerated.

During delivery, in the majority of cases, the churns are not fastened and sealed, but may be opened by the milkman, so affording opportunity for adulteration and infection. In some cases, too, a dipping-can is used in delivery. Again, the common practice of buying extra milk to make out a shortage is responsible for increased chances of infection.

After reaching the consumer.—It is difficult to see how matters may be improved after the milk has reached the consumer, except by education of the people to the necessity of carefully storing milk, if it has to be kept, at as low a temperature as possible, and in some place as completely shut off from living and sleeping rooms as may be.

Typhoid Fever.—Impure water supplies to cow-sheds have already been mentioned as a source of general infection, but in the case of one disease—typhoid—the water supply is so pre-eminently the source of danger as to need special remark. Epidemics of typhoid fever have in several instances been traced definitely to infected milk, but here, at any rate, there is no difference of opinion as to the ultimate source of the contagium. In this case the cow is not suspected, but it is generally recognised that infection is from the human subject, either directly or more commonly through the medium of an infected water supply. Milk is rendered dangerous either by intentional “watering” or, more often, from the use of infected water for cleansing churns or milking vessels, or by means of flies. Whatever the cause, typhoid infection may take place either at the farm, or in the town dairy, or after the milk has reached the consumer’s house.

Another frequent source of danger is the occurrence of some contagious disease, either in the persons or among the families or intimates of milkers or others engaged in preparing the milk, and no doubt this is the source of infection with diphtheria and scarlatina.

Lastly may be mentioned the danger from the use of preservatives in milk, especially when it is remembered that not uncommonly milk is dosed successively by the farmer, the contractor or middleman, and the retailer, with some more or less injurious antiseptic. No one can doubt that the effects of these agents, taken even in small doses day after day, are harmful to the consumer.

And now, having very inadequately pointed out the dangers which may arise from an impure milk supply, it remains for me to outline the alterations necessary in the existing legislation in order to secure the efficient and necessary control.

The legal provisions which apply generally in England and Wales are contained in :—

1. The Dairies, Cowsheds, and Milkshops Orders of 1885, 1886, and 1899 ;
2. The Contagious Diseases (Animals) Act, 1886, section 9 ;
3. The Infectious Diseases (Prevention) Act, 1890, section 4.

The Dairies, Cowsheds, and Milkshops Orders are made under Section 34 of the Contagious Diseases (Animals) Act of 1878, and provide generally for the registration of all cowkeepers, dairymen, and purveyors of milk : for the lighting, ventilation, drainage, and water supply of cowsheds and dairies to the satisfaction of the local authority ; and for the prevention of infection or contamination by servants or attendants, or by the improper use of the buildings. But besides these general provisions there are the two important Sections 9 and 15. Section 9 states that “a local authority *may* make regulations for (1) the inspection of cattle in dairies, (2) prescribing the lighting, ventilation, cleansing, drainage, and water supply, (3) for securing cleanliness of milk stores and milk vessels, (4) for prescribing precautions to prevent infection or contamination.”

Section 15, as amended by the Order of 1899, provides that the milk of a diseased¹ cow (1) shall not be mixed with other milk, (2) shall not be sold or used for human food, and (3) shall not be used as food for swine or other animals unless boiled ; and *in the case of (1) and (2)*, these shall apply to disease of the udder certified by a veterinary surgeon to be tubercular.

The Contagious Diseases (Animals) Act, 1886, Section 9 (4), gives the officer of the local authority power of entry for enforcing the said Orders (not including the Order of 1899), and this Act also defines the “local authority” as the Rural or Urban Sanitary Authority (and so gives no power to the County Council).

The Infectious Diseases (Prevention) Act, 1890, Section 4, gives the medical officer of health power to inspect any dairy, and, if accompanied by a veterinary surgeon, the cattle, if he has evidence that the milk is causing infectious disease (not including tuberculosis), provided that he

¹ The word “disease” in reference to cattle is only used to include those conditions scheduled in the Contagious Diseases (Animals) Act, namely, Anthrax, Cattle-plague, Foot and Mouth, and Pleuro-pneumonia.

has an order from a Justice having jurisdiction in the district. The dairyman may then be required to show cause why an order should not be made requiring him not to supply milk in the district.

Of the alterations in, and the additions to the foregoing, which are necessary to adequately protect the public, the most essential is that the Order be made *obligatory* on all local authorities. This is the first step to uniformity of procedure, the absence of which is a cause of great injustice in many cases. Then the word "disease," as used throughout these Orders, must be made to include not only tuberculosis of the udder, but also all cases of tuberculosis in which clinical symptoms can be seen. Further, cows with tuberculous udders should be compulsorily slaughtered.

This inclusion of tuberculosis would necessitate the conferring of powers on the local authority to enter dairies and cowsheds for the purposes of this disease, a power which they do not possess at present.

Another most important addition to the law is the making of notification of all udder diseases incumbent on cowkeepers and dairy-men. It is manifestly both unsafe and unjust to allow the dairyman to decide which are dangerous affections of the udder and which are not, and especially in view of the fact that the diagnosis of tubercular mastitis calls for a good deal of pathological and clinical experience, and is a matter of difficulty even to the veterinary inspector. At the same time the cowkeeper should be required to immediately isolate any cow with udder disease pending the inspection of the veterinary surgeon.

With regard to the construction of byres, the Model Regulations fail to specify the minimum cubic space requirements for country cowsheds, and having in view the very insanitary condition of some of these, it would be well to require the same cubic space as in town byres, viz., 800 cubic feet for each cow.

In the administration of these provisions it is important that the County Council, the authority charged with carrying out the provisions of the Contagious Diseases (Animals) Act of 1894, should have concurrent powers with the other local authorities to deal with dairies and cowsheds.

It is also highly necessary that the local authority should have similar powers to those conferred by the Public Health (Scotland) Act, 1897, Section 61, by which the local authority, on the certificate of the medical officer of health, or other legally qualified medical practitioner, that the outbreak or spread of infectious disease is attributable to milk supplied by any dairyman, whether wholesale or retail, may require the dairyman, whether within or without the district, to furnish a complete list of his customers in the district, and also of the farmers and dairymen or others from whom the milk was obtained.

Lastly, as was recommended in the report of the Departmental Committee on Preservatives and Colouring Matters in Food, 1901, the use of any preservatives or colouring matter whatever in milk should be prohibited.

Such, then, are the changes which are necessary to secure adequate control of the milk supply. That such control as exists at present is inadequate is admitted on all hands, and that the suggested alterations would produce radical improvement may be confidently predicted from the great success which has attended their adoption, either as a whole or in part, both in favoured districts at home and in more enlightened nations abroad.

PECCAN NUTS.

The natural order JUGLANDACEÆ yields us various edible oily nuts in addition to the well-known fruit of the walnut, *Juglans regia*. There are about a dozen species of the genus *Carya*, native to North America, and all forming large forest trees. Their timber is heavy and coarse grained, of considerable strength and toughness, but not suitable for building, as it does not stand exposure to weather and is liable to insect attacks.

The common Hickory, also known as Shell-bark, Shag-bark, and Scaly-bark Hickory, is *C. alba*; it grows to a height of 80 or 90 feet, the fruit is nearly round with a very thick rind, and is known as Hickory nuts.

C. porcina grows to a height of 70 or 80 feet, and yields a superior timber: its fruits are known as Hog-nuts or Pig-nuts, they are pear-shaped, and the kernels are sought after by pigs, squirrels, and other animals.

C. amara, the Bitter nut or Swamp Hickory, yields small nuts which are very bitter and not eaten by any animal.

C. oliviformis grows to a height of 60 or 70 feet on the banks of the Ohio and Mississippi: it yields an olive-shaped or elliptical fruit, which has the finest flavour of any of the nuts of this genus. They are known as Peccan nuts, and are occasionally imported into this country, where they are quickly bought when discovered. Variants of the name are Pecan nuts, Peckary nuts, and Illinois nuts. A sample, in a rather dry state, obtained from Bradford, gave the following results on analysis:

Shells, 54·4 per cent.		Kernels, 45·6 per cent.	
The kernels contained—			
Water	...	...	4·84
Ash	...	...	1·63
Oil	...	...	67·92
Fibre	...	...	5·43
Nitrogenous matter	...	...	10·93
Carbohydrates	...	...	9·25
			100·00

They are rather more oily and less nitrogenous than walnuts, which they resemble in flavour.

For comparison, we append different analyses, from different sources, of the edible portions of the fruit of other nuts, some in a fresh state, and others in a dry, or shop, state.

PERCENTAGE COMPOSITION.

	WALNUTS.		FIL- BERTS.	HAZEL- NUTS.	COCO-NUTS.		PIGMY Coco- NUTS.
	Fresh.	Dry.	Fresh.	Dry.	Fresh.	Dry.	Dry.
Water	44·5	7·2	48·0	7·1	46·6	5·8	5·2
Ash	1·7	2·0	1·5	2·5	1·0	1·8	·9
Oil	31·6	57·4	28·5	62·6	36·0	67·0	67·7
Fibre	·8	4·6	2·5	3·2	2·9	4·1	4·4
Nitrogenous matter ..	12·5	15·8	8·4	17·4	5·5	8·9	7·4
Carbohydrates	8·9	13·0	11·1	7·2	8·0	12·4	14·4
	100·0	100·0	100·0	100·0	100·0	100·0	100·0

The pigmy coco-nuts are the fruit of the Honey Palm or *Jubaea spectabilis*: vide *Agricultural Students' Gazette* [2], VI. 103; August, 1893.

E. KINCH.

AGRICULTURAL EDUCATION.

An important conference on this subject, which was convened by Mr. Charles Bathurst, jun., M.R.A.C., and Mr. J. C. Medd, was held in the Shire Hall, Gloucester, on Saturday, October 15th, 1904.

The Right Hon. Sir John Dorington, M.P., presided. The gathering was representative of both agriculturists and educationists, and elicited the views of many of those most interested in the subject and most capable of throwing light on it from different points of view.

After the opening remarks of the Chairman, the meeting was addressed by the Right Hon. the Earl of Onslow, President of the Board of Agriculture and Fisheries, who was very sympathetic with the objects of the conference, and anticipated important useful results therefrom. The subjects of the papers read were broadly classified into four, two of which occupied the morning hours and two those of the afternoon.

Higher Agricultural Education was the subject of a paper by the Right Hon. Sir William Hart-Dyke, followed by papers on Local, Experimental, and Demonstration Plots by Professor T. H. Middleton, of Cambridge University; on the Functions of an Agricultural College, by John Percival, Director of the Agricultural Department, University College, Reading; and a note by the Rev. J. B. McClellan, M.A., of this College.

The subject of the Education of the Small Farmer was opened by the Right Hon. Lord Monteagle, President of the Irish Organisation Society, and continued by Professor Robert Wallace and Mr. Frederick Verney. M. Henri Grosjean, Inspector General of Agriculture in France, contributed a paper on the Ecoles Pratiques d'Agriculture, and made special reference to the "Alexandre Delhomme" practical school of agriculture at Crézancy (Aisne).

In the afternoon, Mr. R. L. Morant, C.B., the Permanent Secretary to the Board of Education, made a few appreciative and instructive remarks showing that the Board clearly understood the importance as well as the difficulties of the subject. The Education of the Labourer was the subject opened by a paper by Sir Thomas Dyke-Acland, and continued by Mr. George Lambert, M.P. ; and with papers by Mr. G. F. Dutton, of Bunbury, on a Rural Elementary School, and by M. René Leblanc on Ecoles Primaires Supérieures. The Education of the Agricultural Expert and of Teachers was dealt with by Mr. A. D. Hall, of Rothamsted, the Rev. Canon Steward, Principal of the Salisbury Training College, and Mr. R. P. Ward, of the Cheshire County Council.

Other speakers at the conference included the Right Hon. Henry Hobhouse, M.P., Mr. Henry J. Elwes, F.R.S., Mr. Martin J. Sutton, Mr. J. M. White, Mr. M. W. Colchester-Wemyss, and Mr. James T. Hobbs.

The conveners are to be most heartily congratulated on having called such a representative meeting and organised such a valuable collection of material and presented it in the space of a few hours. We abstain from noticing the papers and speeches at any length, as a complete report of the conference is published by the Gloucestershire Education Committee and can be obtained at the price of threepence.

We noticed among those directly connected with the R.A.C., either past or present, who attended the conference, in addition to the Chairman of the meeting, the Earl of Ducie, F.R.S., Lord Estcourt, Colonel Curtis Hayward, Colonel Chester Master, the Rev. the Principal, R.A.C., Professors E. Blundell, E. Kinch, and R. Wallace, the Hon. A. B. Bathurst, M.R.A.C., Charles Bathurst, M.R.A.C., Lieutenant-Colonel Paget, R. Anderson, E. Armitage, M.R.A.C., M. W. Colchester-Wemyss, J. D. Crewdson, Edric Druce, M.R.A.C., H. J. Marshall, M.R.A.C., H. S. Mathews, C. Annesley Cooke, Bruce Swanwick, M.R.A.C., and Christopher Turner.

MUSICAL AND DRAMATIC ENTERTAINMENT.

The annual entertainment given by the R.A.C. took place on Tuesday evening, December 6th, in the College Hall, when a good company, which included many of the chief residents of the town and neighbourhood, responded to the invitations issued. The first part was musical, the programme being as follows :—

Quartette	...	... "March of the Men of Harlech"...	..	<i>J. Barnby</i>
		Messrs. Trier, Henniker, Barker, and Taylor.		
Song	...	... "Sing me to Sleep" ...	...	<i>E. Green</i>
		Mr. T. L. Sullivan.		
Song	...	... "Off to Philadelphia" ...	...	<i>Haynes</i>
		Mr. C. Annesley Cooke.		
Trio	...	... "Sweet and Low" ...	..	<i>J. Barnby</i>
		Messrs. Trier, Barker, and Taylor.		

Song	...	"The place where the old horse died"	Whyte-Melville
		Mrs. Forsyth Forrest.	
Song	...	"Thy Blue Eyes"	Bohm
		Mr. D. Trier.	
Reading	...	"Play up! and play the game"	...
		The Principal.	
Song	...	"Within my Heart"	H. Trotère
		Professor Locke.	
Pianoforte Solo	...	"Valse"	Maurice Moszkowski
		Mr. T. L. Craven.	
Songs	...	(a) "There's a Land"	Frances Allitsen
		(b) "The Little Irish Girl"	Herman Lohr
		Hon. J. Henniker.	

It will be seen that with one exception the programme was sustained entirely by College talent, and Mrs. Forsyth Forrest's kindness in consenting to add welcome variety to the bill of fare in the shape of one of her always acceptable contributions was gracefully acknowledged by the Principal in a short preface to his reading. Mrs. Forrest's selection, "The place where the old horse died," was greeted with enthusiastic applause and an encore. Mr. Sullivan, Mr. Annesley Cooke, Mr. Trier, Prof. Locke, and the Hon. J. Henniker all did well, the three last-named being encored. Professor Locke substituted "You and I," and Mr. Henniker repeated Lohr's charming and characteristic Irish ditty, which he sang admirably, and which was evidently much to the taste of the audience. Of the part songs, Barnby's delightful lullaby, "Sweet and Low," was by far the most successful, being very tunefully sung, with marked taste and expression, and in response to a well deserved encore the last verse was repeated. The "Men of Harlech" were a little uncertain in setting out on their "March," and were some time in getting well into their stride. Mr. T. L. Craven's spirited pianoforte solo was heartily redemanded, and he rendered valuable service as accompanist, being assisted in this department by Mrs. Annesley Cooke and Miss Forsyth Forrest. The Principal's reading consisted of a stirring original setting of "Play up! play up! and play the game." After a short interval, the curtain rose on William Suter's amusing farce, "A Quiet Family," the *dramatis personæ* being as follows:

Mr. Benjamin Bibbs	...	...	...	Mr. C. N. W. EVANS
Mr. Barnaby Bibbs	...	...	...	Mr. A. E. SOLIGNAC
Mr. Peter Parker	...	...	...	Mr. T. L. SULLIVAN
Grumpy (Mr. Barnaby Bibbs' butler)	...	...	...	Mr. W. OGILVY
Mrs. Benjamin Bibbs	...	...	...	Mr. P. J. MURRAY
Mrs. Barnaby Bibbs	...	...	...	Mr. G. M. DOBSON
Miss Selina Summers	...	...	...	Mr. E. C. BARKER
Snarley (Mrs. Benjamin Bibbs' maid)	...	...	...	Mr. R. S. BISCOE

Scene in room at the Bibbs' House.

The laughable little piece was thoroughly well played. For "a quiet family," the Bibbs' *menage* was a remarkable one. Owing to the eccentric testamentary dispositions of a deceased relative, these two ill-assorted couples, Mr. Benjamin and his crushed and submissive wife, and Mr. Barnaby and his overbearing and tyrannical spouse (the ladies

being sisters as well as sisters-in-law), were condemned to share the same house. The only point on which the quartette could agree was their determination that their ward, Miss Summers, should not wed the man of her choice, Mr. Peter Parker. By way of completing this picture of connubial bliss, the respective domestics also led each other what we suppose is generally understood by the term of "a cat and dog life." In the end, however, the downtrodden revolt, the tyrants submit, and the curtain descends on happiness complete, if temporary. Mr. Evans's "Benjamin" and Mr. Solignac's "Barnaby" were both effective performances, the contrast between the two being well brought out, and the same may be said of Mr. Murray's and Mr. Dobson's capital representations of the Mesdames Bibbs. Mr. Murray's presentation of "Mrs. Benjamin's" rebellion against and defiance of her boorish husband was distinctly clever. Mr. Barker made an attractive and graceful "Miss Summers," and his impersonation must be ranked among the most successful of College "ladies"; while Mr. Sullivan's "Peter Parker" received adequate treatment. Mr. Ogilvy was an excellent butler, and Mr. Biscoe made up admirably as Mrs. Benjamin's maid, and played the part with conspicuous success. The scenery and stage effects were, as usual, by Professor Paton, assisted by Messrs. A. C. Anderton, B. J. Pero, A. J. Riley, and A. P. Slingsby, while the prompter was Mr. G. H. C. Kearton, and the property man Mr. R. Gilliat. Mr. Knowlson supplied the wigs and rendered efficient aid in the dressing room. The quintette, "Good night" (A. Scott Gatty) by Messrs. Henniker, Barker, Trier, Cooke, and Taylor, concluded a very pleasant evening, after which the guests and performers were entertained with refreshments by the Principal and Mrs. McClellan.

DIPLOMA EXAMINATIONS.

At the end of last term the following gentlemen obtained the Diploma of Membership: Mr. Ernest Whiteman Amsden, Baron Louis Anatole Eugene Solignac, the Hon. John Ernest De Grey Henniker, and Mr. Sotoris R. Stavroulopoulos.

Mr. Robert Conrad Mankowski obtained an Associateship.

The External Examiners were Mr. William McCracken in Agriculture, Dr. J. A. Voelcker in Agricultural Chemistry, Professor H. Robinson in Land Surveying and Engineering, and Professor Sir G. T. Brown in Veterinary Science and Practice.

SCHOLARSHIPS.

Last term the first and second Scholarships were divided by Albert Sasson and H. S. Mathews, whilst the third was gained by C. Annesley Cooke.

OLD STUDENTS.

Mr. Percival T. Maw has been appointed Agent for A. C. Pass, Esq., Wootton Fitzpaine Estate, Charmouth, Dorset.

STEEPLECHASE.

The annual steeplechase on the College Farm took place on the afternoon of Friday, December 9th, in wet and muddy weather, snow followed by rain having made the going very heavy. The course was rather longer than usual, being nearly three miles. There were sixteen entries, but only eleven starters; however, this was a larger number than usual. For the first part of the race Riley led, closely followed by Simmons, Chell, and Henniker. In No. 7 Henniker took the lead and kept it, winning easily, Riley being second, and Chell third. A yard divided second and third. Mr. Bruce Swanwick very kindly umpired. Result: J. de G. Henniker 1, A. J. A. Riley 2, A. H. Chell 3, A. Mathias 0, K. McDiarmid 0, H. Vernon 0, E. B. Lees 0. H. de B. Archer, L. H. Simmons, A. C. Anderton, and A. P. Slingsby did not finish.

R.A.C. BEAGLES.

The pack has so far this season had very good sport considering the number of bad scenting days and too great abundance of hares in many places we have had to contend with. There have been some remarkably good runs, one of which, at Duntisbourne, is especially worthy of record, where after a fast 45 minutes with one check only we ran into our hare in the open. We also were successful in killing our first hare on Mr. Hobbs' farm, at all times a most popular meet. We have during this session enlisted the services of several extra whippers-in, namely, Messrs. E. B. Lees, J. W. Addison, and L. V. Akers, to whom we tender our thanks for the energy and skill which they showed on these occasions. Improvements have been carried out at the kennels, and a very large area of country has been secured, so that adequate support of the pack being assured from outside, it is only a question of support from the members of the hunt which will insure its success in the future.

OBITUARY.

We much regret to record the death of James Edwards, M.R.A.C. Born 1850 at Trentham, Staffordshire. Died July 16th, 1904, at Ashby Lodge, Ashby Folville, Leicestershire; *ætat.* 54. Mr. Edwards was in the Football fifteen in 1868 and 1869, and took his Diploma in July, 1870. He afterwards farmed for several years at Woodhorn, Morpeth, Northumberland, during which time he contributed various useful papers to Farmers' Clubs and the like: *e.g.*, "On the Agricultural Holdings Bill" to the Newcastle Farmers' Club, June, 1883; "On the Agricultural Future" to the Cleveland Chamber of Agriculture, January,

1886; and in 1885 he was the reporting Judge on the Farm Prize Competition in connection with the Preston meeting of the Royal Agricultural Society (for Report see *J.R.A.S.E.*, 1885, [2] vol. xxi. 547). From 1888 for thirteen years Mr. Edwards was agent to Mr. Antony Gibbs, of Tyntesfield, and Mr. Martin Gibbs, of Barrow Court, near Bristol, Somersetshire. He several times acted as Judge and Reporter on Machines and Implements for the Royal Agricultural Society. His reports in the *Journal* of the Society are on "Miscellaneous Implements exhibited at Plymouth," 1890, [3] vol. i. 624; this relates to exhibits entered as "New Implements" competing for the silver medal at Plymouth; "Miscellaneous Implements exhibited at Chester," 1893, [3] vol. iv. 552; "The Trials of Self-binding Harvesters at Chester," [3] vol. iv. 702 (this last in conjunction with W. Anderson); "Reaping Machines Past and Present," 1900, [3] vol. xi. 292. Mr. Edwards retired two years ago to live on his property in Leicestershire, and died after but a very few months occupation of a house which he had just built there. He always kept up his interest in the R.A.C. and its students, and attended their gatherings at the Old Students' Club and at Past v. Present Cricket Matches when able so to do. His death is lamented by a large circle of friends, and he will be much missed in his own locality, where he entered into the parochial, social, and political life of the district, and endeared himself by his genial qualities and his attainments.

COLLEGE NOTES.

Mr. H. Curwen, M.R.A.C., has presented to the College a very interesting series of photographs illustrating some aspects of Forestry and of Charcoal-burning in the Forest of Dean.

CRICKET.

[The following was held over from last number.]

R.A.C. v. EAST GLOUCESTERSHIRE.—Played on June 29th, at Cheltenham.
Score:—

EAST GLOUCESTERSHIRE.				R.A.C.			
E. B. Joyner, b Lyon	..	...	19	H. S. Mathews, b Parker	...	...	0
R. M. Davey, b Lyon	...	...	0	R. C. Mankowski, st Manners, b	...	...	0
A. P. S. Newman, b Lyon	...	...	0	Drew	...	...	0
C. Tillard, b Poore	...	...	96	K. McDiarmid, b Drew	...	...	5
Major M. Williams, b Hopton	...	...	13	E. F. Longcroft, b Drew	...	...	7
W. N. Unwin, b Lyon	...	...	0	J. Poore, c Haworth, b Parker	...	...	10
A. S. Pruen, b Hopton	...	...	4	A. S. White, b Parker	...	...	1
H. C. Manners, ct sub., b Lyon	...	...	56	G. Lawson, b Parker	...	...	8
W. Bell-Haworth, not out	...	...	46	G. Lyon, not out	...	...	14
W. S. Drew, b Hopton	...	...	11	H. C. Bell, b Drew	...	...	1
G. W. Parker, b Hopton	...	...	0	E. Hopton, b Newman	...	...	15
Extras	...	...	31	Gandy, absent ill	...	...	0
				Extras	...	...	4
Total	...	...	175	Total	...	...	68

R.A.C. v. GLOUCESTER.—Played on the College ground on Wednesday, July 6th. On going in again the Collegians made 32 for 4 wickets (A. S. White not out 11). Score:—

GLOUCESTER.	
G. Romans, b Gandy	1
H. W. Arkell, b Gandy	30
W. Freeman, c Lawson, b Gandy...	0
F. Tandy, c Cook, b Hopton ..	38
J. Hawkins, b Lyon	10
T. Rust, c Lyon, b Gandy...	5
T. B. Powell, c Poore, b Gandy ...	3
W. Roberts, c Gandy, b Hopton ...	16
F. N. Fox, not out	9
Preedy, c and b Poore	16
E. Hawkey, c Hopton, b Poore ...	5
Extras	29
Total	162

R.A.C.	
G. Lawson, c and b Romans	2
A. S. White, c Hawkins, b Roberts	13
E. Hopton, b Roberts	1
K. McDiarmid, b Preedy	1
R. C. Mankowski, b Roberts	9
G. Lyon, b Roberts	10
C. A. Cooke, b Roberts	2
H. C. Bell, c Hawkins, b Roberts	10
J. Poore, b Preedy	0
H. Matthews, c Tandy, b Roberts	2
Gandy, not out	0
Extras	9
Total	59

R.A.C. v. SWINDON.—Played on July 9th, at Swindon, Score:—

SWINDON.	
D. C. A. Morrison, st Lawson, b Bell	25
G. W. Matthews, c Lyon, b Bell...	24
Harling, c Lawson, b Bell... ..	27
A. Hartley, c White, b Gandy ...	32
S. Warner, b Gandy	62
C. Williams, not out	13
A. W. Lapham, b Butt	7
E. G. Wainwright, not out	24
H. Davies	} Did not bat.
E. Beardshaw	
R. M. Plummer	
Extras	33
Total	247

R.A.C.	
A. S. White, c Matthews, b Williams	16
R. C. Mankowski, st Beardshaw, b Williams	0
G. Lawson, 1-b-w, b Williams ...	0
E. Hopton, run out... ..	1
Gandy, c Plummer, b Williams ...	55
H. C. Bell, not out	16
J. Poore, c Warner, b Lapham ...	2
G. Lyon, b Lapham... ..	0
W. Butt, b Williams	0
H. H. Beardsley, b Lapham	1
H. de B. Archer, b Lapham	3
Extras	20
Total	114

R.A.C. v. STROUD.—Played on July 13th at Stroud. Score:—

R.A.C.	
H. C. Bell, c Fergusson, b Poole ...	0
A. S. White, c Darke, b Huggins	4
Gandy, b Huggins	20
G. Lawson, b Poole... ..	0
K. McDiarmid, b Poole	1
E. Hopton, c Sale, b Huggins ...	10
C. A. Cooke, b Huggins	0
G. Lyon, c Merrett, b Poole	0
W. W. Dobson, c Darke, b Poole	10
E. F. Longcroft, b Poole	1
G. Emblem, not out... ..	14
Extras	19
Total	79

STROUD.	
B. Warman, c Lawson, b Gandy ...	0
E. L. Sale, c McDiarmid, b White	42
Huggins, b Bell	21
C. Merrett, 1-b-w, b White	44
V. W. Lawson, b White	12
G. J. W. Holloway, b Cooke	18
H. W. Holloway, b Cooke... ..	17
D. Fergusson, b Lyon	11
H. O. Crewe, c Gandy, b Lyon ...	7
H. Poole, not out	23
S. B. Darke, b Gandy	19
Extras	26
Total	240

R.A.C. v. MALMESBURY.—Played on July 16th at Malmesbury. Score:—

MALMESBURY.	
May, 1-b-w, b Hopton	3
Clarke, run out	0

R.A.C.	
A. S. White, c Jones, b Lodge ...	9
G. M. May, c Jones, b May	5

Lodge, c Cooke, b May	...	...	40	H. C. Bell, b May	...	...	9
May, b Lyon	...	...	4	E. Hopton, c Jones, b May	...	...	0
Pitt, c Poore, b May	...	...	31	G. Lyon, b Forrester	...	...	14
Bates, b White	...	...	7	W. W. Dobson, 1-b-w, b May	...	...	4
Forrester, b McDiarmid	...	...	10	G. Lawson, b Pitt	...	...	12
Lloyd, c May, b Poore	...	...	14	K. McDiarmid, b Pitt	...	...	0
Jones, not out	...	...	17	H. S. Mathews, not out	...	...	7
Curtis, c Lawson, b Lyon	...	...	3	C. A. Cooke, b Lodge	...	...	3
Alexander, b Lyon	...	...	0	J. Poore, b Pitt	...	...	0
Extras	...	...	14	Extras	...	...	4
Total	...	...	143	Total	...	...	67

R.A.C. v. GLOUCESTER.—Played July 23rd, at Gloucester. This match was not begun till four p.m. owing to rain. Score:—

R.A.C.				GLOUCESTER.			
R. C. Mankowski, b Preedy	...	...	0	Rev. O. E. Hayden, c Bell, b Hopton	...	...	36
Gandy, c Romans, b Roberts	...	...	3	J. Owner, c Poore, b Bell	...	...	12
A. S. White, b Roberts	...	...	3	Preedy, b Cooke	...	...	24
H. C. Bell, c Powell, b Roberts	...	...	1	W. Roberts, c Bell, b McDiarmid	...	...	28
H. S. Mathews, b Preedy	...	...	0	G. Romans, b Hopton	...	...	40
C. A. Cooke, b Preedy	...	...	0	E. F. Huggins, c Poore, b McDiarmid	...	...	0
G. Lawson, c Preedy, b Roberts	...	...	42	A. E. Godwin, not out	...	...	7
E. Hopton, b Preedy	...	...	4	H. Bain, not out	...	...	19
W. W. Dobson, not out	...	...	4	F. Rust,	} Did not bat.		
K. McDiarmid, c Tandy, b Roberts	...	...	8	F. Tandy,			
J. Poore, b Preedy	...	...	0	T. B. Powell,			
Extras	...	...	6	Extras	...	...	11
Total	...	...	68	Total (6 wickets).	...	...	177

R.A.C. v. CHELTENHAM.—Played on Wednesday, July 27th, on the home ground. The visitors won easily, making 168, and dismissing the R.A.C. for 23. We followed on, but only made 82 in the second innings. Score:—

R.A.C.							
G. Lawson, b Mills	...	...	0	b Mitchell	...	...	24
R. C. Mankowski, b Ford	...	...	0	did not bat	...	...	0
H. C. Bell, b Mills	...	...	0	run out	...	...	0
A. S. White, b Mills	...	...	0	c Barnett, b Manners	...	...	13
Gandy, c Wood, b Mills	...	...	10	b Mitchell	...	...	6
E. Hopton, c Wood, b Mills	...	...	0	not out	...	...	4
W. W. Dobson, not out	...	...	9	st. Norman	...	...	4
K. McDiarmid, b Ford	...	...	0	b Manners	...	...	4
E. F. Longcroft, b Mills	...	...	1	c Ford, b Manners	...	...	1
H. de B. Archer, b Ford	...	...	0	c and b Manners	...	...	8
J. Poore, b Mills	...	...	0	c Lawrence, b Manners	...	...	11
Extras	...	...	3	Extras	...	...	7
Total	...	...	23	Total	...	...	82

CHELTENHAM.

C. S. Barnett, b Gandy	...	...	...	...	...	13
E. Barnett, b Gandy	...	...	...	...	...	7
H. R. Ford, b Gandy	...	...	...	...	...	17
P. H. Ford, b Bell	...	...	...	...	...	25
W. Wood, c Bell, b Hopton	...	...	...	...	...	5
R. Lawrence, c Hopton, b Poore	...	...	...	...	...	22

Mills, c Dobson, b Gandy	...	...	...	...	18
H. A. Henson, c and b Hopton	...	...	...	...	21
E. C. Manners, c Longcroft, b Gandy	...	...	...	...	6
A. Mitchell, c Lawson, b Hopton	...	...	...	...	4
F. M. Norman, not out	...	...	...	...	6
Extras	..	...	...	...	24
Total					168

R.A.C. v. CIRENCESTER.—Played on Saturday, July 30th, on the Town ground, in beautiful weather. The R.A.C. winning the toss, batted first. Lawson and White made 14 between them, when White was caught. The rest of the team fared disastrously, W. Tovey taking 8 wickets for 9 runs. Cirencester made the high score of 338 for 7 wickets. Score:—

R.A.C.

G. Lawson, 1-b-w, b Tovey	...	7
A. S. White, c Winstone, b Tovey	...	7
R. C. Mankowski, b Tovey	...	0
Gandy, c and b Tovey	...	6
H. C. Bell, b Allen	...	5
C. A. Cooke, c Tovey, b Allen	...	1
G. Lyon, b Tovey	...	3
G. Hopton, not out	...	2
W. W. Dobson, b Tovey	...	0
K. McDiarmid, b Tovey	...	0
J. Poore, b Tovey	...	0

Extras 4

Total 35

CIRENCESTER.

C. E. Wager, b Gandy	...	0
H. St. G. Rawlins, b Gandy	...	28
C. C. Gouldsmith, c Gandy, b Bell	...	19
G. Winstone, c Poore, b Hopton	...	28
C. Allen, b Cooke	...	95
S. Boulton, b Gandy	...	42
W. G. Tovey, not out	...	40
R. J. Mullings, c Poore, b McDiarmid	...	42
W. Ponting, not out	...	6
H. S. Godwin	} did not bat	
Jennings		

Extras 38

Total 338

BATTING AVERAGES.

	No. of innings.	Times not out.	Highest score.	Total runs.	Average.
Lawson	23	1	42	235	10·7
White	23	2	28	172	8·2
Lyon	18	1	17	111	6·5
Bell	23	2	34	135	6·4
McDiarmid	21	1	47	119	5·9
Mankowski	14	0	21	74	5·3
Hopton	18	4	19	69	4·9
W. W. Dobson	15	2	10	54	4·1
Poore	21	1	14	69	3·4

Cooke and Mathews also played in the last few matches.

BOWLING AVERAGES.

	Runs.	Wickets.	Overs.	Maidens.	Average.
Lyon	535	33	169·4	31	16·2
McDiarmid	150	9	49	1	16·7
Hopton	444	24	101·4	14	18·5
White	369	19	76·4	4	19·4
Bell	324	16	70·3	6	20·2
Poore	334	10	64	5	33·4
Lawson	85	2	10	0	42·5

Cooke also bowled in last few matches with success.

FOOTBALL.

RUGBY FOOTBALL TEAM.

- A. C. ANDERTON (Captain).—A keen, persevering captain, and a hard worker. Fully deserves the very much better results which the team has gained.
- H. S. MATHEWS.—The mainstay of the team. Plays a first-class game both in attack and defence. His excellent kicking is of great value.
- H. DE B. ARCHER.—A hard-working forward. Shows up well in rushes.
- A. S. WHITE.—Follows up well. A useful tackler, and works hard in the scrum. One of the best forwards.
- P. J. MURRAY.—A fast three-quarter, but too light; made a good half, tackling well. Must mark his man more closely.
- K. MCDIARMID.—Much more successful at back than at half. Fields the ball well. A good tackler, but should make more certain of finding touch.
- H. T. WARD.—A fairly fast three-quarter, and passes well. Should tackle lower.
- R. C. MANKOWSKI.—Worked hard in the scrum, but not so successful at three-quarters. Passes well, but an uncertain kick.
- C. A. COOKE.—A fast three-quarter, making good use of his weight. Sometimes uncertain in taking passes on the run. Good on the defence.
- E. BARKER.—A light three-quarter, but a clever tackler. Saves rushes pluckily.
- D. TRIER.—A useful man in the scrum and in the loose, but rather slow.
- W. OSBORN.—A heavy forward, working hard all through the game. Makes good use of his weight.
- W. OSWALD.—A light forward; knows the game well. A good tackler.
- H. CHELL.—Plays up keenly; was often conspicuous towards the end of the session when he knew the game better.
- A. OSBORN.—Often good in the loose, but must do more work in the scrum.
- J. V. B. SIVRIGHT.—The heaviest of the forwards, and an extremely useful addition to the team, but unfortunately not often able to play for the College owing to his engagements with the London Scottish.

Also played.

- PROF. V. DE V. H. WOODLEY.—The best three-quarter. The team were unfortunate in losing him early in the season owing to a broken collar bone.
- H. VERNON, H. JUNG, and H. C. BELL.

RUGBY.

R.A.C. v. READING SCHOOL.—Played on Saturday, October 22nd, at Reading. This was the opening match of the season for the R.A.C., and resulted in a win. This victory was taken as a good augury of change from the bad luck which the College Rugby football team has experienced for several seasons. The College were represented by a fairly good team, which with a little practice should be able to make a very good side. The forwards, especially, played well together, and did much useful work. Soon after the start H. S. Mathews scored a try for the College, which was unconverted. The game continued about the centre of the field till Cooke scored another try for the College after a brilliant run; this was converted. The College continued pressing, two more tries being scored by them. For Reading School Seely succeeded in getting a try, and half-time was called soon after, the College leading by 11 points. The second half opened with a brisk attack by the visitors, but the College three-quarters did good work in checking them, and soon afterwards Mathews scored another try which Cooke failed to convert. Almost immediately after the kick-out the College outsiders did a neat piece of combined work resulting in a try by Murray; Cooke with a good kick added the major points. Reading School then made a final attack, and after some pressing Seely got another try, Griffiths

converting. The game continued equal till the end, Mankowski getting one more try for the College just before the whistle blew for "no side." Score: R.A.C., 2 goals 5 tries (25 points); Reading School, 1 goal 1 try (8 points).

R.A.C. v. STROUD ATHLETIC.—This match was played on the R.A.C. ground on Saturday, October 29th, and resulted in a tie, no points being scored by either side, as the teams were very evenly matched. From a free kick Mathews made a good attempt at goal, but unfortunately failed to score. The College pressed the visitors for the greater part of the second half of the game, but were unable to obtain any points. Cooke and Prof. Woodley made several good attempts to get away, but were unable to accomplish anything.

R.A.C. v. CHELTENHAM A.—Played on Saturday, November 5th, at Cheltenham. The Cheltenham team had the best of the game at starting, and scored a try, which was not converted. From a free kick to the R.A.C. a good attempt at goal was made by Mathews, which, however, failed. Then Cheltenham again pressed and scored another try, which was not converted. Just before half-time another free kick was given to the College, but nothing was scored. In the second half a good run was made by Prof. Woodley, and the College pressed for some time, after which the ball returned to their 25, where it remained till time was called, nothing more having been scored. Cheltenham won by 6 to 0.

R.A.C. v. GLOUCESTER OLD BOYS.—Played on the home ground on Saturday, November 12th. Gloucester Old Boys kicked off, and play soon settled in mid-field; indifferent marking out of touch, however, soon let our opponents inside the College 25. After an anxious five minutes Ward brought relief with a very good kick into touch. Free kicks for off-side became somewhat common, and shortly before half-time a loose rush let the College inside the opposing 25, where a nice piece of combination, in which Murray, Mathews, Ward, and Cooke took part, resulted in Mathews scoring far out, to which he added the major points. Play ruled fairly even from this period till half-time. After the interval a free kick for off-side gave our opponents an advantage which they were not slow to accept, placing a very good penalty goal. Towards the end of the game Prof. Woodley sustained a fractured collar bone and went full back, where he happily was not greatly required, as for the last quarter of an hour the Gloucester team were never dangerous, two free kicks against them were unproductive, and play was mainly confined to their 25, but no further score resulted, so that a very pleasant and evenly contested game terminated in a win for the College by 5 points to 3.

R.A.C. v. BERKSHIRE WANDERERS.—Played at Reading on Wednesday, November 16th, and resulted in a win for the College. Although at first the home team pressed the R.A.C. it was not long before Murray, being unmarked, got away, and brought the College into their opponents' 25. There was a good deal of loose play, and finally Sivright scored from a kick across from Mathews, and also converted. In the second half the R.A.C. pressed the home team, and just before time Ward scored from a good pass by Cooke, and the major points were added by Sivright. Score: R.A.C., 10; Berkshire Wanderers, 0.

R.A.C. v. SWINDON.—Played at Swindon on Saturday, November 19th. Rain made the ball difficult to handle, and the game was chiefly confined to the forwards. Play in the first half was very even, Swindon only appearing likely to score once, when a good tackle by McDiarmid averted the danger. Mathews kicked a penalty goal for the College. In the second half the College forwards, led by White, Osborn, and Archer, played with more dash, and Mathews scored far out after some short passing near the line, but failed to convert. Swindon nearly scored from a forward rush, but were driven back, and were afterwards kept entirely on the defence. Cooke made several good attempts to cross, but was too well marked. The College won by 6 points to nil.

R.A.C. v. CHELTENHAM COLLEGE.—This match was played on November 30th, on the Cheltenham College ground, and resulted in a victory for the home team. During the first part of the game the R.A.C. were pressing their opponents and a good attempt was made by Sivright to score, but he was unable

to touch down. Cheltenham College then began to press, and through some good passing were able to score a try, but failed to convert. Mathews then made a splendid rush towards the home team's line, but was stopped, and the ball kicked into touch. In the second half the R.A.C. again pressed, but from a scrum the ball was got away, and a try scored by Cheltenham College which was converted. After this Mathews again made a good attempt to score for the R.A.C., but failed. The home team then got the ball, and Tennant scored a good try, which was converted. The game resulted in a win for Cheltenham College by 11 to 0.

R.A.C. v. ST. PAUL'S COLLEGE, CHELTENHAM.—Played on Saturday, December 3rd, on the Cheltenham ground, and resulted in a win of 4 goals (one from a mark) to nothing for the Agriculturists (19 points to *nil*). The first half proved very interesting, especially the passing amongst the home backs, but the dash and weight of the opposing forwards frustrated all attempts to penetrate the R.A.C. territory. Shortly after the beginning of the second half the R.A.C. forwards, being led by W. Osborn, burst away, and kept up a continuous attack till the close of the game. From a clever piece of play by Mathews, Ward secured the first try, the former placing a magnificent goal. This was closely followed by a mark from Anderton, Mathews converting. The home team were now demoralised, and Chell from some loose forward play added two more tries near the touch line, the major points in both cases being added by Mathews.

ASSOCIATION.

R.A.C. v. CIRENCESTER GRAMMAR SCHOOL.—This match was played on the Grammar School ground on Wednesday, November 2nd, and was a fast, even game, resulting in a draw of one goal all. Our only goal was shot by Ward soon after half-time. The following represented the College:—Sullivan, goal; Dobson and Lyon, backs; Jung, Mankowski, and Solignac, half-backs; Knubley and Mathews, right wing; Cooke, centre; Ward and Archer, left wing.

R.A.C. v. CIRENCESTER TOWN.—This match was played in the Park on November 3rd, and resulted in a win for the Town by 3 goals to 1. The Town goal keeper played a fine game and saved brilliantly on two or three occasions. Kearton was the only one who scored for us.

R.A.C. v. DOWNTON AGRICULTURAL COLLEGE.—Played at Chippenham on November 9th, and resulted in a win for the College by 6 goals to 2. Our goals were shot by Mathews (3), Cooke (2), Ward (1). Mathews played brilliantly, and as usual on the Chippenham ground had his shooting boots on. Knubley on the left wing also played well. Our halves were too strong for the Downton forwards and completely upset their combination. The following represented the R.A.C. in both matches: Sullivan, Dobson, Lyon, Jung, Mankowski, Solignac, Knubley, Mathews, Cooke, Ward, and Kearton.

CORRESPONDENCE.

To the Editor of the Students' Gazette.

Dear Sir,—I should be much obliged if you would find space for a few words I am anxious to say for the College Beagles, which have, in my opinion, been much maligned for results over which they have no control.

The chief bone of contention seems to me to be that the beagles spoil the Football, which is, of course, the chief recreation of the College in the winter months. Now, Sir, I would ask you is this shown in practice? At the present moment both the beagles and football flourish, and it is only when football is on the decline, owing to dearth of talent, &c., that one hears all these complaints against the pack. I think both might reasonably have more support from a College consisting of nearly 80 able bodied men, who must or ought at any rate to take some form of exercise for the sake of bodily health.

In the second place, it is said that the beagles, when they were started, took away men from the football team. This is true in so many words, but I would

ask you again, was this a loss to football? I think not myself, as I know of nothing worse for any undertaking than to have men who are not really keen concerned in it, as these men by their action showed themselves to be. The football team is not affected by the beagles to any extent, but varies according to whether there is the necessary talent available, which was forthcoming at the time of our crack team some years ago, but which did not continue up to the time of starting the beagles.

Lastly, I would appeal to the broad-mindedness of the readers of this letter. Why is it not possible to maintain both in a College where there must be men with many different tastes, who do not all wish to devote their energies to the same end. What is the alternative? That a certain number play football, and the rest do nothing. Is this a healthy or natural state of affairs, or is it a state to be desired?

We only wish to run the pack for the good, and, I hope, the pleasure of a part of the College, and in no way counter to the football, whose successes of late are a source of congratulation and open up a new era after a run of so many bad seasons.

Hunting brings one into touch probably more than any other recreation with the agricultural population of this country, and so on this score I think it is particularly suitable we should run a pack of some sort. That the pack is appreciated by those who live in the neighbourhood is amply shown.

Finally, I consider it an excellent advertisement for keeping up the numbers of the College, as there are doubtless many who would come to a place where they thought sport was encouraged.

Yours very truly,

J. E. DE GREY HENNIKER,
Master R.A.C. Beagles.

R.A.C. GOLF CLUB.

Owing to the extremely bad state of the course very little golf has been played at the College this term. On Saturday, December 10th, a match was played against the Sapperton club on the Sapperton course, resulting in a victory for the College by one game. K. McDiarmid, a member of the R.A.C. team, at the same time won the Sapperton medal with the useful net score of 74. The teams and results were as under:—

R.A.C.				SAPPERTON.			
E. B. Haygarth	...	...	1	J. Rawlins	...	...	0
Prof. Paton	...	...	1	E. C. Sewell	...	...	0
Prof. Blundell	...	...	0	E. C. Cripps	...	...	1
W. F. Mott	...	...	0	R. J. Mullings	...	...	1
T. L. Sullivan	...	...	0	A. H. Gibbons	...	...	1
K. McDiarmid	...	...	1	A. Stradling	...	...	0
Prof. West	...	...	0	W. W. Dobson	...	...	1
M. de la Gandara	...	...	1	W. H. Cole	...	...	0
F. de la Gandara	...	...	0	H. Boulton	...	...	0
J. V. B. Sivright	...	...	1	W. Wearing	...	...	0
Total	...	...	5	Total	...	...	4

REVIEWS.

A TREATISE ON THE BRITISH FRESHWATER ALGÆ. By G. S. West, M.A., Professor of Natural History, Royal Agricultural College. pp. xv., 372. Cambridge University Press, 1904. Price 10s. 6d. net.

For a long time the want has been felt for a convenient book by which

students, teachers, and others interested in microscopical studies could obtain an accurate knowledge of the common Algæ of rivers, lakes, and ponds. The present volume is the outcome of numerous demands for such a work, and it contains a concise account of all the genera of Algæ as yet discovered in the fresh waters of the British Islands. Algæ exist everywhere in damp and wet situations, and sometimes give a decided character to the landscape. In this work information is given with regard to their occurrence, collection, and preservation, and likewise the best methods of studying them. More actual progress has been made in the study of these plants within the past ten years than had been accomplished altogether up to that time, not merely with regard to the discovery of new forms, but also in the acquirement of a sound knowledge of their life histories and relationships with other plants. The chief value of the book lies in the fact that it is an attempt to summarise and put in a concrete form much of this recent work, particularly that bearing on the phylogeny and classification of Algæ. It is from certain groups of the green Algæ that all the more highly organised plants of the Archegoniate series have been evolved, and therefore particular interest is attached to the phylogeny of the Algæ themselves. Modern research and enquiry has produced evidence which indicates that the green Algæ have all been derived from motile unicellular ancestors. The most primitive genus of these motile unicells is known as *Chlamydomonas*, the species of which swim about freely through the water by means of a pair of cilia or flagella. This genus occupies a unique position as the phylogenetic starting-point of the various lines of Chlorophyceous descent, and it must be regarded as the real primitive form of green plant and the foundation stone, so to speak, of the vegetable kingdom. Not the least interesting feature of these plants is the existence in many of them of a wide polymorphism, brought about by their efforts to adapt themselves to changes in the conditions of their environment. The author gives a brief but clear account of the *Bacillariæ* (or Diatoms), and it is the first appearance of the most recent classification of these plants in the English language. The frontispiece to the work is a plate illustrating the Plankton of Lough Neagh, Ireland, and of Loch Ruar, Scotland; whilst scattered through the text are 166 process and half-tone illustrations. Nearly the whole of these are original and remarkably well executed, and in them are figured Algæ from all parts of the British Islands. Special stress is laid on the importance of acquiring an accurate knowledge of the geographical distribution of the lower types of Cryptogams (especially Desmids), as such knowledge would probably shed much light on one of the most interesting of all problems concerned with the later phases of the earth's history, namely, the land-connections of previous periods. We heartily congratulate Professor West on producing a work which, while it will be of immense service to all students of these lowly forms of life, will also be of value to all users of the microscope for natural history purposes. The type, the illustrations, and the general "format" of the work is excellent, and reflects credit on the printers, J. and C. F. Clay, and the publishers, the University Press, Cambridge.

REPORT OF THE CONFERENCE ON AGRICULTURAL EDUCATION HELD AT GLOUCESTER ON OCTOBER 15, 1904. Edited by Charles Bathurst, jun., M.A., M.R.A.C., and John C. Medd, M.A. Published by the Gloucestershire Education Committee. pp. 220. Price 3d.

A complete report of a most interesting and instructive conference (see page 59), which should be in the hands of *all* interested in agricultural education.

ERRATA.—In last number, p. 35, line 12 from bottom, *for* A. Horton *read* G. Lyon; p. 36, line 35, *for* Wednesday, June 22nd, *read* Thursday, June 23rd.

ROYAL AGRICULTURAL COLLEGE CLUB.

We publish a list of the Members of the Agricultural College Club, and hope that any errors in names or addresses will be made known to the Editor. We also hope that a larger number of old members of the College and Staff will join the Club, and attend the annual meeting and dinner, which is during the Royal Agricultural Show week.

LIST OF MEMBERS.

President for 1905—

*Secretary—*E. B. HAYGARTH, Cirencester.

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- CLELAND, A. L. H., Esq., Hollingwood House, Charwelton, Northants.
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SOME SUGGESTIONS ON WOODLAND MANAGEMENT
IN ENGLAND.

One of the most important, though too frequently one of the least understood, duties of a land agent is the proper management of woodland areas.

Whether there be a head forester or a working foreman, the agent will in most cases be held directly responsible to the owner of the woods for their management.

The object of these notes is to show that, while not forgetting that the wishes of the owner is the first consideration in the management of all woods, due consideration can be given both to the important question of game preservation and to the æsthetic question, which on many estates is of no less importance, and yet at the same time the correct principles of silviculture be followed, and a comparatively satisfactory revenue be produced.

While the system of coppice and coppice with standards may produce good game coverts, yet owing to the declining price of coppice I consider it will generally be necessary to adopt some other system. It may happen that one is dealing, not with coppice or coppice with standards, but with areas under some high forest system. This as usually practised in England is confined to the system of an even aged wood, either mixed or pure, with clear cutting at the end of the rotation, which, though essentially one of the most profitable systems under certain conditions, for the growth of certain kinds of trees, cannot be recommended for small areas, if the game question is to be fully considered. It is only in the early stages that any cover exists: after that it will, if properly managed, present the appearance as it were of so many scaffold poles: and later on clean straight boles devoid of lateral branches till the crown is reached.

As regards the principal systems of forestry,

Coppice,
Coppice with Standards, and
High and Seedling Forest,

the two first are well known in this country: and they and the last are fully described in most text books that deal with the subject. I refer forestry students to Schlich's "Manual of Forestry," vols. 1 and 2, as giving especially clear and concise descriptions of them.

Before it is possible to satisfy oneself as to the merits or demerits of these systems, some of the requirements and peculiarities of the more common forest trees should be noticed.

Generally speaking trees can be classified as shade bearing or light demanding, Sycamore and Douglas Fir occupying an intermediate position, though the majority of light demanding species will bear a considerable amount of shade while young. Locality, too, will make a difference, for trees at high altitudes—where the growing season is short—require more light and growing space than if growing in a warm sheltered valley.

Beech, Silver Fir, Spruce, and Hornbeam are the best shade bearing trees as commonly grown.

The *Cupressus Macrocarpa* (a tree which perhaps will be grown more largely in the future) can also be classified as a shade bearer.

Douglas Fir, Sycamore, and Norway Maple occupy an intermediate position between shade bearing and light demanding trees.

Larch, Scots Pine, Corsican Pine, Oak, Ash, Elm, Sweet Chestnut, Poplar, and Willow are all light demanding trees.

Another important point to consider is the rate of growth in height of individual trees in relation to each other when grown under similar conditions.

Of the light demanding trees, all of which as a rule grow faster when young than the shade bearing trees (with the exception of *Cupressus Macrocarpa*), the Poplars and Tree Willows and Douglas Fir grow the fastest. Perhaps next in order follow Larch and Elm; and next Ash, Sweet Chestnut, Sycamore, Norway Maple, Corsican Pine, Scots Pine, and Oak: but with these latter, with the exception of Oak, there is really not a great difference if each is growing in the soil best suited to its requirements. Corsican Pine grows quicker than Scots for about the first 30 years.

Of the shade bearing species not already mentioned, the Hornbeam grows quickest when young (though later on it is usually surpassed by all the other trees mentioned), and then Beech, but the latter usually overtakes the former before long. Spruce comes next to Beech, but after several years the Beech will be surpassed. Silver Fir is the slowest grower when young, but after about 30 years it begins to grow very quickly, and soon overtops Beech and Spruce.

In those cases where high forest with standards or a shelter wood compartment system is contemplated, it will be necessary to consider:— Firstly, if the site is at all exposed, the storm-resisting properties of trees to be left. For example, Spruce (Sitka Spruce excepted) is the least storm proof, Douglas Firs are apt to have their tops damaged, whereas Silver Fir will stand much exposure.

Secondly, if natural regeneration is aimed at the date at which trees usually begin to seed and the frequency of the seed years are matters requiring careful consideration.

Thirdly, their individual capacity for protecting the soil and each other in early youth. Trees like Oak, Ash, Willow, and Poplar afford but slight protection; whereas Douglas Fir, Spruce, Larch, Scotch and Corsican Pines, and Sweet Chestnut soon afford a canopy, thus to some extent assuring the success of the young wood, and also saving much

labour in keeping the crop clean. This is especially to be regarded when planting open land. Silver Fir and Beech had best be grown under a shelter wood, as in early youth they are very susceptible to climatic influences.

A brief consideration of these points will lead one to the following conclusions :—

In exposed places or on poor soil one of the shelter wood systems should be adopted in preference to clear cutting, and (A.) in the case of light demanding trees, these (I.) should not as a rule be planted pure (Douglas Fir excepted) on any large area as an even aged wood. Exceptions to this are :

- (1) If the rotation is to be very short.
- (2) If nothing else is likely to grow.
- (3) If it is intended to underplant between 15 and 50 years of age.

II. If mixed evenly with shade bearing trees of the same age the results are not usually satisfactory in the end, as the shade bearing trees will surpass their neighbours unless removed in time ; but then underplanting will be necessary before long. Therefore it is necessary to give them a start. It should be noted that small poles of shade bearing trees are usually of less value than similar poles of such trees as Oak, Ash and Larch, and Sweet Chestnut.

III. Mixtures of shade bearing and light demanding trees should be by groups or patches. Exceptions to this are Larch mixed with Beech or Hornbeam, for in these cases the Larch can keep ahead of the latter. So also Sweet Chestnut and Ash can be mixed evenly with Beech or Hornbeam provided the rotation is short, and in the case of Sweet Chestnut at any rate a short rotation only is permissible. Poplars and Tree Willows can be mixed evenly with all shade bearers, except perhaps *Cupressus Macrocarpa* on account of its rapid height growth. It should be remembered that as a rule trees in a mixture are not usually so liable to insect or fungoid attacks.

IV. Excluding Douglas Fir, Norway Maple, and Sycamore, the best methods to grow light demanding trees are :

- (a) As standards in coppice : in this case it is advisable to allow the coppice a long rotation, 20 to 25 years, if timber alone is considered.
- (b) Grown pure when young and underplanted with shade bearing trees when height growth has ceased its greatest activity.
- (c) In mixture, by patches only, with shade bearing trees, either with clear cutting or under the shelter-wood compartment system. Exceptions to this have already been noticed.
- (d) As standards, with underwood of shade bearing trees, but in this case only storm proof trees should be left as standards, and also such trees as are suited to a long rotation.

- (e) By adopting the group or strip system of natural or artificial regeneration, and here, though all the trees may consist of light demanding species, yet the soil and trees will not suffer so much from adverse climatic influences owing to the groups of trees being of different ages. But it would be better if shade bearing trees were mixed by patches as in (c), unless the groups or strips are very small in extent, when they should be composed individually of shade bearing or light demanding trees.

It should be noted that (b) and (d) are usually clear cut ; whereas (e) is the shelter wood group system or strip system.

The compartment system would give too large an area if entirely under light demanding trees, with the exception of Douglas Fir.

The shelter wood selection system is not to be recommended for light demanding trees, and if other shelter wood systems are adopted it is essential to remove the mother trees at an early date.

The group or strip systems could be modified by clear cutting each group or strip and artificially regenerating.

In the foregoing remarks, mixtures of light demanding trees can only be treated in the same way as one species of such trees, grown pure, if the trees composing the mixture are similar in their demands on light and in their height growth.

Norway Maple and Sycamore are of very little value unless of large dimensions, therefore they should only form a small proportion of any mixture. They can best be grown as at (d), or along with other light demanding trees as in (b) : in this latter case it would be well to give the other trees a start of say five years, for Maples and Sycamore are somewhat oppressive to other light demanding trees, and will themselves, as already stated, bear a certain amount of shade.

Douglas Fir, owing to its very rapid growth and its susceptibility to climatic influences, had best be grown by itself or mixed by patches as in (c) or (e).

B. In the case of shade bearing trees.

These have already been noticed as regards mixtures with light demanding trees. But it remains to consider under what systems they can best be grown either in mixture with each other or by keeping each species separate. Speaking generally they lend themselves to being grown under almost any system, either mixed or pure, because of their shade bearing peculiarities.

Silver Fir and Beech, being very tender when young, should be raised under a shelter wood : when grown together they form an excellent mixture.

The shade bearing trees are not suited for an over wood, either as standards or two-storied high forest, as they form too dense a covering for underwood of many years' growth.

Any of the shelter wood systems are suitable, the selection system being often employed for Beech, and is especially indicated for exposed poor localities. Where clear cutting is not objected to, perhaps the

best timber can be grown under ordinary even aged high forest, whether mixed or pure.

A brief consideration of the sylvicultural systems, as previously described, should convince those connected with English estate management that the method in which woodland areas are now managed in England is not in the majority of cases the most advantageous. Though many areas now under coppice and standards leave little to be desired in the way of management, in many cases it would be advantageous to allow a longer period (20 to 25 years) to elapse before cutting the coppice.

In those cases where an attempt is made to grow timber as an even aged high forest with clear cutting, there are probably many complaints that there is no cover for game, as previously indicated, unless indeed there is a promiscuous undergrowth, but in this case the wood will have been too heavily thinned and will indicate faulty management.

But if some of the other systems were adopted it is possible that timber and game could be grown together, if only ground game were absolutely exterminated from the woods, and until this is so natural regeneration of any trees will be a rare occurrence in England.

For instance, if an area is planted pure with larch and underplanted when say 25 years old, there would be two periods in one rotation in which there would be young growth which would afford protection for pheasants. Or again, by adopting the group or strip system, in say a 20 acre wood, there would always be a small area under young trees, and this should satisfy the gamekeeper. And though in these cases natural regeneration may not be attempted, yet artificial aid can bring about the desired result.

In all cases it would be advisable to adopt the shelter wood selection system on a narrow strip round the outside of all woods, and to keep a hedge on the outside of this well trimmed and dense. By this means a shelter belt is formed, valuable from a forestry point of view and invaluable in the eyes of the sportsman; for by this means birds come out high and are not so inclined to run back, as the guns will be hidden from their view.

But whatever system is adopted it will always be well to bear in mind that the shade bearing trees should almost always be given a place, for although it may appear that their individual production may not be remunerative, yet their beneficial influence upon the production of first-class timber of large dimensions of the light demanding trees cannot be over-estimated. Circumstances will decide at what period in the rotation they are to be introduced: but when it has been decided, in making a new plantation, to introduce them along with a mixture of other trees, it will be necessary, as previously indicated, to exercise the greatest care, and above all to avoid the ordinary "nurseryman's mixture," which, to judge from many instances, would appear to be the result of some time-honoured custom based upon ignorance of sylvicultural requirements.

PERCIVAL T. MAW.

RABBITS.

If the fields around the College present the same appearance in 1905 as they did when I knew them more than twenty years ago I venture to say there is one animal on the well-stocked farm attached to the R.A.C. conspicuous by its absence : but this in itself forms a valuable object lesson. [N.B.—Beware of a *bull* in a narrow lane—and in an examination paper—especially if of the Irish variety ; for if you harrow his feelings every examiner is familiar with the use of a certain implement, and contrary to economic practice the more barren the soil of which the candidate's brain is composed the more vigorously and rigorously does he accomplish his thankless task. But leaving the ploughman in his sandy furrow to await in his turn the decision of the judges, let us pass on to the consideration of the questions before us.]

Though the subject of the present article is "Rabbits," it may prove that they only form a peg on which to hang—this is rather reversing the usual order of things, for rabbits are themselves frequently hanged and almost always hung—a few common-place lines not even reticulated so as to include all that might be said, but only forming a fringe to the subject.

Judging by the R.A.C. syllabus of study, the student is, by hypothesis, entirely ignorant of the Science he is about to consider. Why, then, should I assume that the R.A.C. man necessarily knows all about rabbits?

Taking my cue from R.A.C. methods, *Lepus cuniculus*, the common rabbit or coney, is a quadruped which resembles the genus *Homo* (only he is a biped) in one respect at least, namely, that its hock becomes its heel. The male is called a buck (and the female a doe, just as though they were fallow deer) but really he (no, surely ! she) is a mammal, and herein resembles a whale, yes, and a shrew mouse, respectively the largest and smallest of mammals. The rabbit also bears a likeness to the Simian family in that it is the host of similar parasites. The fox, doubtless, considers the rabbit specially created to serve him with food ; while the boy regards him as specially designed as food for his powder and a target for his shot : but let him beware, when "bunny" shews the "white feather," that he shoot well in front else his "bag" will prove no larger ! Surely, after this word picture the veriest tyro will recognise *Lepus cuniculus* when he sees him.

While the farmer, of commercial instincts, values them more highly dead than alive, the

"pretty little rabbits
so engaging in their habits"

have a "life history" as well as a "death" history, though the latter more frequently affords a topic of excited narrative after a day spent in pursuit of them. When newly born they find themselves naked and blind in a nest of grass lined with fur which their dam has torn from her belly for the purpose. Sometimes the female places her young in one portion of a burrow which other rabbits are occupying ; while at

other times she makes a bed to receive her family at the end of a "hole" in the open field, in which case she covers up the entrance on leaving it with soil as a precaution against the visits of their natural enemies. Fur soon grows: their eyelids open and their weak eyes begin to see in some nine days: in three or four weeks they can run about, when the mother leaves them to get their own living while she prepares for another family.

It may not be out of place to mention that a hybrid of a hare and rabbit has never been produced experimentally and is not known in a state of nature. The so-called Belgian hare is a variety of rabbit. The habits of the hare, though its food is similar, differ from those of the rabbit. Hares are not gregarious, as rabbits are; their young are born fully clothed with fur. They do not burrow but merely crouch, uncovered, in a depression of the soil, though they assist nature somewhat by scraping out a "form." A hare is about three times as heavy as a rabbit.

The number of rabbits which owe their origin to a single pair has often formed the subject of calculation. The resulting product is often represented as enormous; but after all it depends upon several important factors, viz.: the length of time chosen, that is upon the number of multiplications; the assumed increase at a birth; the age at which rabbits begin to breed; and the number of litters in a year—or in the lifetime of a rabbit. The data are—rabbits breed at about six months old, the period of gestation being about 30 days, produce from three to eight little ones, from four to eight times a year in England. The natural life of a rabbit is seven or eight years. It is possible that in South-Western Europe and North-West Africa, in which countries it is believed they originated, and in Australasia, where they have been imported, rabbits may increase more rapidly. While wintry weather is probably responsible for cessation of breeding, yet rabbits where acclimatized appear able to endure moderate cold with impunity. The climate of Scandinavia is said to be too cold for them. I think, however, the failure of rabbits to live there in a wild state is principally due to the impossibility of getting food when the ground is so continuously and deeply covered with snow. In English winters rabbits become very fat. A good couple of rabbits will then weigh 6 lbs. after being gutted, while their summer weight, when out of condition, is about 5 lbs.

The average market value of rabbits now-a-days is about 1s. 9d. per couple, or barely 4d. per lb., while beef and mutton sells at 6d. to 9d. per lb., and poultry from 8d. to 1s. per lb. About 25 years ago rabbits were readily sold at 2s. 6d. to 3s. 6d. per couple, but then their skins were worth from 4d. to 8d. per pair—now the demand for them is much less—and few if any rabbits were imported from Australia: now they are shipped in cold chambers in large quantities from Australia and New Zealand as well as from Belgium. In 1902 the total imports of dead rabbits was 451,457 cwts., of which 341,037 cwts. came from our colonies.

It seems unnecessary to prove that rabbits are an unprofitable class of stock on arable farms, yet I suppose a bald statement to this effect may be challenged. It is reasonable to allow that any crop which is "nipped in the bud" does not come to maturity. The question whether rabbit fattening pays, when they are fed without waste on fully grown crops, does not affect the case where crops are devoured before they attain a nominal fraction of what would otherwise be their ultimate weight. Of course a blade of barley or a tiny turnip plant forms food for the rabbit, but no one will contend that its food value is equal to the cost of growing it to that insignificant size. But where rabbits exist—no matter how small their number—they consume the embryo crop. Complete protection of the crop by rabbit-proof netting has the result of either starving or driving away the rabbits, since they cannot live without eating, but in this case they may be said to be non-existent. As a matter of book-keeping the rabbit account and not the vegetable account should be charged with the expense of the netting. If crops are diminished to the extent of say 2 per cent., whether in acreage or total value, this means a loss of about £15 per 100 acres: now to produce £15 worth of rabbit flesh means marketing over 300 large rabbits. But a tenth of this number (and they not necessarily full grown) are quite sufficient to do £15 worth of damage, while their own increase in weight and value due to the food consumed would not probably be more than £1. It must also be borne in mind that the loss of a crop one summer means—*ceteris paribus*—a diminished crop the following year.

I have seen it stated that rabbit farming can be made to pay on poor grass land, and that such "land will feed fifty rabbits to the acre." I question the latter statement. But even if so many were kept the gross return would be far from representing the nett profit. They must be enclosed in some effectual way, for such stock no longer belongs to the farmer, as would sheep, when they have crossed the boundary. There is also disease to be reckoned with, and foxes—two-legged as well as four-legged—and other enemies. Again, there is the question of catching your stock. This opens up another chapter—of accidents.

I have hitherto treated the subject from its commercial aspect; but were it not so well known it would be surprising to state that there is another point of view from which rabbits are regarded—they afford sport. Now it is difficult, if not impossible, to draw a strict border line between the commercial and sporting sides of rabbit-catching. Rabbits are *feræ naturæ* in law and are so regarded by sportsmen. Rabbit coursing does not deserve to be classed as a sport, since it is practised under unfair, because unnatural, conditions. The rabbit has been already caught alive, bagged, and taken to the selected spot where he is let loose to be chased by dogs over ground unfamiliar to him. The sport (?) is all one-sided, the quarry not having a fair chance of its life, which is an essential condition in all true sport, even though the dog or man run no equal risk—a still truer test of genuine sport.

The recognised methods of obtaining legitimate sport are shooting a rabbit when he runs from his "form" or his *pro tem.* hiding place with the object of "taking cover" or "going to ground." Or he may be chased by dogs on his own ground in field or woodland. Or, again, he may be shot or coursed by dogs when ejected from his burrow by ferrets. There are many other means employed to catch rabbits, the successful use of which demand skill in the person using them. But trapping and netting are not usually classed among sports. The simplest engine—commonly called a "gin" or snare—consists of six or eight strands of fine brass wire twisted together so as to make a flexible rope about 18 inches long; one end being looped the other is passed through it so that when supported by a notched peg it will form freely moving noose; the free end of the wire is attached to a stout piece of string, which in turn is secured to a peg driven into the ground. In order to understand its *modus operandi* it should be explained that rabbits in passing from their burrows to their feeding ground by constant use form a path, just as sheep do in crossing a field to and from a watering place. The rabbit snarer then, by observation with a practised eye, selects a suitable place in the "run," and there sets up and secures his noose. The unsuspecting rabbit travelling quickly along finds himself, if the snare be skilfully laid, caught round the neck, and before he can stop his course and withdraw his head the impetus of his motion has caused the noose to tighten. If he is running fast at the time his neck is sometimes dislocated by the sudden jerk; and if not the more he struggles the more quickly he is strangled. The success of the "gin" as a trap arises from the fact that rabbits cannot see objects directly in front of them at certain distances, their eyes being situated somewhat on the side of their face. But if a suitable part of the run is not chosen and the wire not pitched at the right angle, and not sufficiently hidden by natural obstructions, the rabbit will see the snare in time to avoid becoming securely caught, though he may push down the wire and thus prevent it catching his friends. Rabbits, too, possess a keen sense of smell. It thus happens that snares improperly laid scare rabbits without catching them. Sufficient has been said to show that considerable skill is necessary. Some men have a talent for snaring while others never excel in the art.

The iron spring trap with its pair of ugly jaws and tooth-like edges is too well known to need description. It may be seen any day at an agricultural ironmonger's shop. It is employed at, or rather in, the mouths of rabbit holes. If not set so as to leave but the least possible evidence of its existence, which is done by adroitly covering it with soil, the rabbit will avoid it.

Taking rabbits at night by nets is principally practised by poachers. Briefly stated the plan adopted is as follows:—Choosing a dark and boisterous night, when their presence is least likely to attract the notice of the game or the gamekeepers, three or four men set out for some rabbit stronghold with 150 yards or so of light netting about two feet wide and a bundle of straight pegs. Proceeding noiselessly, the first

thing is to set up the net between the rabbits' feeding ground and their burrows. Next, the men "beat" the field with or without dogs, when bunny rushes towards his home only to be arrested by the net in which he becomes entangled, the mesh being large enough to admit his head but not his shoulders, where he is quickly seized by his pursuers. Large hauls are frequently made by experienced poachers. When brought to book and convicted they laugh at a fine, and often go out the same night and more than cover their day's expenses by a night's "takings."

It is unfortunate that all methods of killing "ground game" inflict suffering on the animal. Comparing shooting, snaring, and trapping, I am of opinion that the first mentioned, when the gun is handled by a competent person, is the least painful. In the second degree comes snaring. But trapping spells torture, because the animal usually remains alive for many hours after its leg has been gripped, mangled or broken by the cruel iron. Why then, you ask, are cruel methods adopted by preference? For several reasons. In the first place mechanical contrivances can be used in situations where to shoot would be unsafe. Secondly, traps can be set where snares would be of no avail. Thirdly, foxes, which rob the snarer of his spoil when caught, do not often venture to touch trapped rabbits—the trap itself frightens them. Fourthly, a mercenary reason, the market value of a rabbit is from 10 to 20 per cent. higher when trapped or snared than when shot. Fifthly, the relative cost of taking game is an item not to be overlooked. I have calculated, taking into account the original outlay in a gun, the necessary license, the cost of ammunition and wasted shots, that at least twopence is to be charged against every rabbit killed by shooting; whereas by means of a snare one penny covers the expense, and in the case of a steel trap, which lasts a long while, about one-eighth of a penny is the cost.

O that the consumer would refuse to buy game which has been trapped, and insist upon having rabbits and hares, whether home-grown or imported, which have not been subjected to unnecessary torture for the sake of a little extra profit!

Want of space prohibits any attempt to explain the use of ferrets. I can, however, strongly recommend a little book published by L. Upcott Gill entitled "Ferrets and Ferreting." The hints on "Shooting to Ferrets," by Mr. A. Niblett, are excellent.

But now I fancy I hear you say—

"Rabbits young, rabbits old,
Rabbits hot, rabbits cold;
Rabbits tender, rabbits tough,
I thank thee, friend, I've had enough."

E. S. DAVIES, M.R.A.C.

FARMING EXPERIENCES IN WEST VIRGINIA.

At the courteous request of the *Gazette's* editorial staff, I write an article upon agricultural life in West Virginia, where I have owned property for ten years. As it is somewhat difficult for those who have

not personally visited America to grasp the exact situation of individual States, let me explain that after the terrible Civil War of 1862-64, the large State of Virginia, which prides itself upon being the "Mother of States," was divided into two portions, the lofty range of Alleghany Mountains being the divisional line. The Eastern portion, extending to the sea-board, is known as Virginia, whilst the mountainous portion is called West Virginia. A decade ago this "Mountain State" was comparatively unknown, being shut off from communication with the outside world on account of the inaccessibility of the roads and the natural ruggedness of the country, a fact which originated the State's motto, viz., "*Montani semper liberi*"; and in that "glorious Land of Liberty"—the United States of America—none value their freedom and independence more than the sturdy mountaineers of West Virginia. Pioneers with axe and mattock, these stalwart Scotch-Irish settlers have passed through many years of hardship and privation, but are now on the eve of enjoying the fruit of their toils. Railways and other enterprises are now opening up this country, abundant in natural resources, such as lumber, coal, oil, and natural gas. However, I must stick to the line, and do my best to speak on farming topics.

"Practice with Science" is the excellent motto of the R.A.C., and the student who throws his lot into West Virginia certainly gets plenty of the former article. West Virginia boasts of many counties; my time has mostly been spent in Randolph County. The whole region abounds in virgin forests, which crown the summits of the West Virginia Hills. The trees are of various kinds, well adapted for producing the finest lumber. The lumber camps take off the best and strongest men, who are paid higher wages than the farmer can afford. Therefore, the farmer, if he does not wish to "get left," must take off his coat and manfully put his shoulder to the wheel, remembering that a "pound of help is worth a ton of advice!" Self-help, self-reliance, and apt resource, with plenty of pluck, are at a premium in a country like this. *En passant*, I would suggest that the aspiring R.A.C. student should take advantage of learning, whilst young, the quickest and handiest methods of harnessing and yoking horses, and so forth; so that he may become skilful with his hands, for "time is money," assuredly, in the States. The arts of horse-shoeing and carpentry should also be acquired, as well as a practical, thorough knowledge of veterinary science—all being very useful and necessary accomplishments in a Colonial life, where every man is for himself. For a long time West Virginia was neglected and overlooked, but recent developments have pushed the State to the front, so that it is now rapidly forging ahead, and is, commercially speaking, as productive as any State in the Union. Capitalists from Pennsylvania, who have lumber and mining interests, are responsible for this beneficial "boom" in this section of country. Randolph County can boast of excellent limestone soil, in which blue-grass and small white clover grow naturally, whilst the numerous mountain streams supply splendid water, thus making the country an ideal grazier's paradise,

The summers are cooler in West Virginia than in the lower lying land of Eastern Virginia, a fact which renders the former country well adapted to stock raising, cattle fattening rapidly towards the fall of the year. On the other hand, the winter in these mountains is often extremely rigorous, making it costly and irksome to winter many head of stock. In order to winter stock successfully, it is of prime importance that one should possess ample and commodious farm buildings, as well as bountiful crops of hay. We may take a leaf out of the Dutch settler's book, his custom being to build the barn before the dwelling-house. As a rule, housing accommodation for stock is very meagre throughout West Virginia, cattle often being compelled to seek the shelter of a barbed-wire fence against the bitterness of a snowstorm.

Kentucky has long been famous for its "blue-grass," thoroughbred horses, prime cattle, and beautiful women. It is the "blue-grass," combined with the "blue blood," that is responsible for these fine products. Stock grazed on blue-grass during the summer months assume the flesh and glossy condition which would require production by means of hand feeding under less favourable circumstances. Blue-grass combines the nutriment of grass and oats together. The grazing facilities of Randolph and Pocahontas Counties, in West Virginia, are equally as good as Kentucky; so that there is a ready demand at Baltimore and Philadelphia stock-yards for cattle and sheep shipped from the former locality.

West Virginian farms, which are usually of an average of five hundred to a thousand acres, consist of land that has been cleared of trees for a number of years, and thus become what is locally known as "improved sod," whilst the woodlands consist of trees that have been hacked with an axe shoulder high round the trunk (to cause them to decay), known as "hackings," as well as the virgin forest. On these last-named lands there is a lot of undergrowth, briars, and natural blue-grass, which afford excellent pasturage for cattle, sheep, and horses. This natural grazing causes the growth of bone and substance in young cattle, which render a good account of themselves when removed to other parts of the States. Horses and sheep thrive particularly well on the lime-stone soil, the former getting active and clever in the hackings, where so many fallen trunks abound: whilst the latter do not suffer from foot-rot and other diseases common to sheep kept in a low-lying country. The limestone goes to the depth of 500 feet, so the country abounds in caves and sink-holes, with a constant flow of water. This section is particularly favoured by rain-falls, caused by the attraction of the forests on the mountain-tops. There is an abundance of pine trees, which are utilised, on a wholesale scale, in the manufacture of pulp for paper.

Shropshire sheep are much favoured by the Americans, and I have found that these ewes crossed with Cheviot rams give good results, as the Cheviot supplies the necessary stamina and "rustling" spirit so requisite for a mountainous district. The plan mostly adopted is to

breed sheep, selling the lambs to buyers in the autumn. The lambs acquire a sweet, gamey flavour, so that the mutton more resembles venison, and is known in New York market as "Pocahontas mutton." Horse breeding is at a low ebb, as few farmers take the interest or possess the judgment which alone bring success in this line. Good horses are bred in Greenbrier County, where the land is of rolling nature; the horse, "Traveller," which carried General Lee throughout the Civil War, was raised here.

Stock should be regularly "salted," which ensures their good health, and is a means of collecting cattle and sheep from the depths of the forest, as they come down to the "salt-holler," and can then be looked over. Store cattle are sometimes purchased in Chicago and Canada, and taken to the mountains of West Virginia to be grazed. The extremely bad dirt roads are a great handicap to the agricultural community, as they become in winter a veritable quagmire, making travel well nigh impossible. A heavy-laden wagon, with four game horses pulling their hearts out, through mud up to the axles, on a raw winter's day, is a sad sight indeed.

Portions of West Virginia are well adapted for fruit raising, an industry which has a bright future, as more money can be made out of fruit than from agricultural crops.

My good mentor, the Professor of Chemistry, would visibly wince if he could see the reckless manner in which "fertilizer" is applied to land, for grain crops, without any consideration to the suitability of the ingredients. An interesting article from the pen of Mr. Herbert Marshall, in a recent *Gazette*, dealt with the question as to the benefits of an agricultural education, such as is afforded at the R.A.C. My own humble opinion is that such an excellent course of instruction, as is given at Cirencester, is of incalculable assistance to anyone wishing to start aright, with a firm foundation for business, in man's "noblest culture"—agriculture. Personally, I regret I did not more fully avail myself of the good opportunities given at the R.A.C. to "get in on the ground floor," as the Americans say. A man, to succeed in the States needs plenty of sound health, active limbs, fertile brains, with the pluck that is not afraid of real hard work. These are "fighting qualities" for the "Battle of Life," which I have found are greatly fostered in the hunting fields of dear Old England.

ARTHUR LAWSON, M.R.A.C.

AGRICULTURAL CO-OPERATION IN ENGLAND.

Amongst the various remedies for ills to which farmers of the present time are subjected, co-operation is the one which is not only of importance in itself, but is that to which attention is drawn in the Press and at almost all meetings where farmers are gathered together. Papers having been read by enthusiasts upon the subject at representative meetings in London and elsewhere, it may be advisable for us to consider the subject with as broad a mind and as judicial a spirit as possible.

Nobody who has carefully considered the question can deny that, broadly speaking, co-operation is one of the secrets of success in any movement, whether serious or the reverse, but when we pass from the abstract principle to the practical details we can clearly see that there are and always will be exceptions which will materially modify our original ideas.

The chief points in the schemes of agricultural co-operation as at present set forth were very clearly expressed by Mr. Yerburch, M.P., in the paper he read before the Farmers' Club in January of the present year. They are co-operation in

- (a) The purchase of requirements, including machinery.
- (b) The sale of produce.
- (c) The establishment of Agricultural Credit Banks.

Let us now look into these three sections: the first class is a very large and comprehensive one, the sub-divisions of which should each be considered separately. In the purchase of manures, feeding stuffs, and seeds, co-operation is a very decided advantage, as not only can the articles when purchased in large quantities be obtained at the lowest cash price, but also it is easier to buy them of the best quality and well up to the guaranteed analysis. An Association for this purpose has been established in Cheshire for some years, having its offices at Nantwich. The method it employs is to carry on the business of a manure, etc., merchant by means of a small council and a resident paid manager. The capital is found by the members each investing some £5 or £10, who are paid 5 % interest thereon before any profit is declared. The net yearly profit is distributed as a bonus amongst the cash purchasers in proportion to the amount of their purchases. The Association was and is still most useful, as it enables the members to obtain for themselves the legitimate profit which otherwise would have passed to the dealers; it also indirectly sets the local prices of different commodities, as no member would purchase from merchants at a higher figure than that of the Association, and in addition the rule of allowing the bonus on purchases for cash and not credit causes nearly the whole of the business to be a cash one, with the result that a much larger amount of business is done with the same limited capital than would otherwise be the case. It appears to me that Associations of this kind in each county or group of counties would be very beneficial to farmers. Moreover, Associations of this kind might be able to produce some effect upon railway companies, which at present, although they profess to be only too pleased to do what they can for farmers if they would only increase the size of their consignments, never apparently carry into practice their profession. It may be that their ideas of size differ considerably from those of the farmer, but personally I should imagine that a consignment of 25 tons of superphosphate or of 200 tons of London manure might be taken at rather less than the ordinary 4-ton rate, but that is not the case on at least two of the large companies.

The co-operative purchase of machines for co-operative use has in

my opinion only a very local significance; where the farms are large there is quite enough work for a full set of implements, and there would be no opportunity of passing them round from one farm to another; but where the holdings are small the exchange of implements is very advantageous. Moreover in many cases farmers at the present time do co-operate in this respect, not that they have any associations, but neighbours borrow from each other, and the good fellowship shown thereby is in many ways very advantageous to the farmers themselves and the welfare of the neighbourhood.

The co-operative purchase of animals is a point hardly ever brought forward by co-operation enthusiasts, but which appears to me to be the branch in which a very large amount of good could be and is being done at the present time. There are distributed throughout the kingdom a large number of Horse Societies which are simply in existence for the purchase or hiring of really good sound stallions for the use of the members at a low fee, lower than if the owner of the horse sent him to travel the district. The members of the society pay a small subscription for the administrative expenses, whilst the service fee is fixed at such a figure that about 100 nominations will pay for the hire of the horse. I am afraid that there is a tendency in societies of this sort not to make them entirely self-supporting but to rely upon subscriptions and donations from persons in the locality to make the balance sheet come out level at the end of the year; this should not be the case, as all schemes of this sort should be absolutely self-supporting. Over and above this hiring of stallions, co-operation for the use of other stock has hardly been considered at all. However, there are a few societies which purchase well-bred bulls for use by their members at low fees. A bull scheme has been started in Bedfordshire during this present year by the County Agricultural Society, which owns twelve bulls stationed in different parts of the county for use of their members at a fee of about 4s. The idea appears to be a very excellent one, but as far as I can judge it will cause a considerable drain upon the funds of the Society unless, as is probable, some of the rich men in the county will defray a very large proportion of the cost; this, I must repeat, is wrong in principle and very bad finance from a pure business point of view. We should all try to purchase the best article at the lowest possible price, but should not expect a richer neighbour to pay half the bill when it appears. We need not consider the question of purchasing co-operative rams, as it would be extremely difficult to find a flock so small that it could go shares in a ram, but with pigs I believe that in many places small village societies would be able to do a considerable amount of good by the purchase of a joint stock boar, to be kept at the homestead of a farmer in the parish, and to be available for the use of the members at a low fee of about a shilling.

Now, having considered co-operation from the purchasing side, let us turn to the question of co-operation for sales. For if the former, as we have endeavoured to show, has in actual practice many difficulties and some disadvantages, then the latter has the difficulties and

disadvantages very largely increased. It is undoubted that co-operation has a great tendency to level prices, and the question which naturally occurs is, will it raise prices up towards that of the highest quality article, or lower them down towards that of a second grade one? All the figures which I have been able to find deal not with the concrete cases of separate individuals but with the gross return to the whole organisation; these are often, I feel certain, very misleading. When the whole question is reduced down to its simplest form it is nothing more or less than—Shall I by combining with my neighbours obtain a higher price for my produce than if I sell it personally? In the vast majority of cases in England I firmly believe that the individual can make a higher price than any co-operative society; moreover, when we consider details I trust it will be shown that there are true grounds for this belief.

In England markets are close at hand, and in very many cases the producer, although not dealing with the absolute consumer, does deal with the retail distributor to the advantage of both parties. The producer can send the article which the distributor knows his customers require, and the latter, when he is certain that he can obtain the produce he can readily sell, can and does give a higher price than the average market price for that article. Instances of this case are almost innumerable. For example, a farmer, a neighbour of my own, supplies eggs to a shopkeeper in London. The eggs are sent at least twice a week, and the prices are— $\frac{3}{4}$ d. each from April to June, 1d. from July to September, $1\frac{1}{8}$ d. from October to December, and $1\frac{1}{4}$ d. from January to March. These prices are considerably above those for large quantities of eggs in the wholesale market. Another difficulty in co-operative sales with many articles is the question as to who is to be the judge of the correct time to put the commodity upon the market. For example during this present winter before Christmas I sold some red clover seed at 63s. 6d. per cwt.; three months later I saw an equally good sample sold for 48s. per cwt. If in this case I had sent the seed into a co-operative store house which price should I have obtained for it, the higher or the lower, at which the society might have sold it? Should I reap the advantage of my luck or judgment in selling when I did, or have to take a lower price to be uniform with my neighbours who had acted differently? It may be argued that the price might have risen, and I should then have been better off; quite true, but it is only a question of judgment, and personally I prefer to rely upon my own, and in this respect I fancy I am not singular.

The great disadvantage of co-operative sales is the tendency to do away with individual enterprise and to reduce all down to a common level. In other walks in life the saying that there is plenty of room at the top is undoubtedly true, and it is likewise the case in agriculture; moreover it is an absolute fact that there is always a market and a good one for the highest quality produce; there are many people who do not mind how much they pay for an article provided it is of the best quality and they can rely upon getting it. Therefore I fancy we can

safely draw the conclusion that co-operative sales in a country which is thickly populated and where transport is easy will not be an assistance but rather the reverse to the good farmer whether he farms upon a large or small scale.

The third point mentioned in Mr. Yerburch's paper was the establishment of Agricultural Credit Banks. The true financial aspect of this point is rather beyond the knowledge of the average farmer. I can state without fear of contradiction that the amount of capital possessed by each individual farmer is more likely to be less than and not greater than that absolutely required for the proper and judicious management of his farm; allowing this fact, from whence is the capital to come to start these banks? If it comes from the general public they will expect a return not less than that they would receive if their money was invested in any of the large joint stock banks at present in existence; if it comes from rich philanthropic men who will expect little or no interest the idea is unsound, and will in the long run be detrimental to the native pride and integrity of the farming population. The example given in the paper, that of Scawby, in Lincolnshire, of which the president of the bank writes, "During the first 10 years of its existence no dividends have been allowed to be distributed," absolutely proves that the scheme is not a sound one.

Having dealt with these three main points, there are a few minor ones which we can briefly consider in conclusion.

Co-operation might give us a greater voice in the choice of our representatives in the House of Commons; but we are told "Put not your trust in Princes," to which every thoughtful man will add "or any Member of Parliament." Co-operative societies may, as we are told they will, bring members together to talk and discuss, thus educating themselves and increasing the desire for fuller technical education for their children. As one who has been engaged in agricultural education for some fourteen years, I can safely say that the desire for education has increased to a marvellous extent during that period, and is increasing yearly, so co-operative societies are not greatly needed for this purpose.

Farmers do co-operate when and where they can clearly see that it is to their advantage; they always have done so and will continue to do so without the aid of any formal societies, and although we may not quite reach the old Roman standard—

"Then none was for a party,
Then all were for the state;
Then the great man helped the poor,
And the poor man loved the great.
Then lands were fairly portioned,
Then spoils were fairly sold—
The Romans were like brothers
In the brave days of old"—

nevertheless we come nearer to it than any other class in the world.

EDRIC DRUCE, M.R.A.C.

A VISIT TO AN INDIAN RESERVE.

I have been asked to write an article on my Canadian experiences for the *Agricultural Students' Gazette*, so I will tell about a clerical journey to a place some 150 miles from Calgary for the purposes of inspection and mutual profit. The Bishop, myself, and three other clerics went by rail to Macleod. Waiting for us there was the missionary of the Peigan Indian Reserve and Home with an inelegant team of four horses, which seemed at first sight to be hitched up with pieces of string, but closer inspection discovered these pieces of string to be merely aids for keeping the main body of harness together. Then we travelled for 35 miles over roads which defy description, and seated on springs, only so-called because the sitter has to spring from them if he wishes to escape being hurt. We travelled without really coming to grief till a creek lay in our way through which we had to ford. The whipple-trees of course took this splendid opportunity for snapping, and then I got wet. We were not more than a mile from the Home, so some of us walked, having tied the leaders to a tree for someone to come back for. At last we reached our destination and most gratefully partook of the good things provided. We were then shewn up to our several bedrooms, which we had to share of course. The bed put aside for me and a somewhat tall fellow parson was a small boy's bed. Perhaps the subject is hardly a topic for conversation, but suffice it to say one's feet protruded at least a lineal foot beyond the bottom rail. The mosquitos held high revel throughout the night. All things, however, come to those who wait; ages upon ages seemed to have passed away when the first grey streaks of dawn ushered in an eventful day. With unusual delight I dress myself, and by walking in the pleasant morning air get a certain amount of rest of which the mosquitos had robbed me.

When we had finished breakfast we proceeded to interest ourselves in the twenty-five Indian boys and girls who are being educated and brought up under the influence and auspices of the Church of England. No one has any idea until he sees for himself what a jolly, even pretty, little animal the Indian child is. He is always laughing, he can ride anything and in any position, he is fond of pretending to be shy but likes you to take notice of him all the same (perhaps in this particular he is like the rest of the world), he can swim like a fish, and is a wonderfully good shot with a stone; so much for his virtues, when he grows up he is not very different from his fathers. The day being very hot some of us bathed in the creek, and the little Indian boys bathed too—how funny they looked, just for all the world like a lot of tadpoles. Presently the luncheon bell rang and we hurried to put on our clothes, for this is a hungry country. After luncheon we sat in chairs listening to the interpreted remarks of the Indians who came in state to present themselves to the "holy man," as they call the Bishop. A downpour of rain fell at the time we were forced to start for the station four miles away. "Little Ears" drove me in his own team, his squaw sitting behind crooning away to her baby, and may I here remark in passing that squalling is not confined to white children, the vast prairies seem to lend

some of their immensity to the human capacity for emitting horrible noises. "Little Ears" and I didn't have a very interesting conversation, neither of us being conversant with the other's language, though every now and then a very guttural "ugh!" made me rather inclined to jump out of the gig and make a bolt for home. As far as I was able I was good enough to signify to "Little Ears" that I liked his horses and his driving, at which he seemed pleased, and to which that terrible "ugh" from the squaw recalled to my startled nerves the difficulty of making pretty speeches to people not accustomed to the polite usages of society. At last we reached the station and at slow speed worked our way to Macleod. Here the tale I tell must be brief. Let me preface by saying a "broncho" is an untrained Indian horse accustomed to defend itself by its forelegs from wolves, cayotes, or any beasts of prey, consequently whenever it feels any excitement the broncho stands on its hind legs and hits out savagely and surely with its forelegs. The preface both tells and explains the sequel. Our Blood Reserve missionary met us at the station with a couple of these brutes, our first look at them revealed a sight that augured ill for great success, they were rearing straight up, fighting savagely with the air. Necessity compelled the majority of our band to find accommodation in other vehicles, but room was found for the Bishop, a Canadian delegate from one of the Missionary societies, the Blood Reserve missionary, and myself. Cautiously holding on to the reins our host descended to welcome his lordship; the bronchos considered this an opportune moment for bolting. They were stopped within three yards of a wire fence, how, I can't pretend to say. We tried to humour them, we whispered sweet nothings in their ears, but the engine driver had no intention of peace, he shunted his engine forward, he shunted his engine backward, he blew off steam, we held on like fury. In spite of our efforts they reared up and struck at us, in spite of their efforts we avoided being hit; finally they hit each other, and then we sat on their heads, and unloosed the harness and extricated them from an awful tangle. We sent the Bishop and the delegate on ahead promising to overtake them shortly, but alas for human decisions, the engine driver would entertain no thoughts of peace, the horses no thoughts of obedience. With grim determination yet with a keen sense of the absurdity of the situation my host proceeded to march forward leading one horse and pulling the rig, while my humble self led the other horse and shoved the rig.

SPENCER H. CUBITT.

ATHLETIC SPORTS.

President.—REV. J. B. McCLELLAN.

Stewards.—PROF. KINCH, PROF. PATON, PROF. BLUNDELL, PROF. McCLELLAN,
B. S. CAVE, ESQ., C.B., C. A. COOKE, A. P. SLINGSBY, E. M. HOPTON,
F. DE LA GANDARA, H. DE B. ARCHER.

Hon. Secs.—W. OGILVY, P. J. MURRAY.

Judges.—PROF. WEST, PROF. WOODLEY, E. B. HAYGARTH, ESQ.

Starter.—J. A. ROSS-HUME, ESQ.

Time Keeper.—PROF. LOCKE.

The Sports held on March 22nd and 23rd although of only average excellence produced nevertheless some interesting contests. The only record broken, and a most important one from the point of view of both spectators and competitors, was by the weather. The rain, in fact, kept off till everything was well over. The large number of spectators on the second day was in large measure due to the favourable conditions prevailing. The Sports Committee, consisting of Messrs. Kinch, Slingsby, Hopton, Gandara, and Archer, with Ogilvy and Murray as Hon. Secs., are to be congratulated on the success which attended their efforts. The prizes were kindly distributed by Mrs. Ross-Hume, and proceedings were brought to a close by a vote of thanks proposed by Murray to Mr. Henniker, Mr. Cave, and Mr. Swanwick, who generously presented cups for the Three Miles, Mile, and Walking Race respectively, and to all those who had assisted to make the Sports a success.

Appended is a list of events and winners. For the highest number of points silver Medals were given to Pryce and Knubley, each obtaining the same number.

100 YARDS.—*First Heat*: 1 Vernon, 2 Hopton; time, 12 secs. *Second Heat*: 1 Mott, 2 Knubley; time, $11\frac{4}{5}$ secs. *Third Heat*: 1 Piha, 2 Murray, w.o. *Fourth Heat*: 1 Cooke, 2 Poore, w.o. *Semi-finals*: 1 Mott, 2 Knubley, time, $11\frac{1}{5}$ secs.; 1 Murray, 2 Cooke, time, $11\frac{3}{5}$ secs. *Final*: 1 Knubley, 2 Mott, 3 Murray; time, $11\frac{3}{5}$ secs.—The heats in this race were uninteresting, but the final was very exciting, particularly as the destination of the Medal depended upon this race, Mott losing it by about 2 inches and the third man being not more than a yard away.

LONG JUMP.—1 Knubley, 19ft. $4\frac{1}{2}$ in.; 2 Poore, 18ft. 9in.—This event resolved itself into a match between Knubley and Poore, as it did last year, the placings being then reversed; they each showed a considerable improvement on last year's distances.

HURDLES.—*First Heat*: 1 Burra, 2 Poore; time, $20\frac{4}{5}$ secs. *Second Heat*: 1 McDiarmid, 2 Knubley; time, $19\frac{2}{5}$ secs. *Final*: 1 Knubley, 2 Burra, 3 McDiarmid; time $20\frac{2}{5}$ secs.—The first heat was devoid of excitement, but the second furnished a very good race which was marred by Hopton, who was leading, touching a hurdle when looking a winner by a couple of yards. The final was won by Knubley through his ability to get away with the pistol, good starting being a feature of his running both in this race and the 100 Yards. McDiarmid, who won the event last year, got out of his stride and failed to do himself justice.

200 YARDS HANDICAP.—*First Heat*: Cooke ser., Slingsby 12yds., and Hopton 10yds., w.o. *Second Heat*: Knubley 3yds., Mott 5yds., and Burra 6yds., w.o. *Third Heat*: 1 Ogilvy 10yds., 2 Akers 14yds., 3 Vernon 5yds.; time, $21\frac{1}{5}$ secs. *Final*: 1 Ogilvy, 2 Vernon, 3 Slingsby; time, $22\frac{1}{5}$ secs.

HALF-MILE OPEN.—1 Mott, 2 Ward, 3 Knubley; time, 2 min. 16 secs.—Won rather easily. This race was run 10 seconds faster than

last year, when the present winner ran unplaced, thus exhibiting conclusively his improvement as an athlete.

THROWING CRICKET BALL.—1 Vernon, 99yds. 0ft. 3in. ; 2 Longeroft, 77yds. 1ft.—The style of the winner was much admired, also the fact that he always threw in the same direction.

PUTTING THE WEIGHT.—1 Lyon, 31ft. 6in. ; 2 Poore, 30ft. 6½in.—This was a simple match between Lyon and Poore, when last year's winner was again victorious, improving on his distance in the former event by 1ft. 9in.

THREE MILE RACE.—1 Pryce, 2 Archer, 3 Ward ; time, 16 min. 53½ secs.—Won easily, the winner leading all the way. A fine struggle for second place. The winner next to Henniker is the best long distance runner we have had here for some time ; his style, however, is very unorthodox. A comparison of the times of the separate miles with Henniker's record is interesting : Henniker—1st mile, 5 min. 24 secs. ; 2nd mile, 11 min. 4 secs. ; 3rd mile, 16 min. 34 secs. Pryce—1st mile, 5 min. 15 secs. ; 2nd mile, 11 min. 5 secs. ; 3rd mile, 16 min. 53½ secs. It will thus be seen that Pryce began faster, but was unable to maintain the high rate attained by Henniker in the latter part of the journey.

BICYCLE EGG AND SPOON RACE.—*First Heat* : 1 Lyon, 2 Kearton. *Second Heat* : 1 Akers, 2 Slingsby. *Third Heat* : 1 Ward, 2 Popple. *Fourth Heat* : 1 Peró, 2 Oswald. *Final* : 1 Lyon, 2 Akers.

THREE-LEGGED RACE.—*First Heat* : Oswald and Archer, Longeroft and Hopton, w.o. *Second Heat* : 1 Akers and Ogilvy, 2 Peró and Poore. *Final* : 1 Akers and Ogilvy, 2 Peró and Poore.

FARM SERVANTS' RACE.—1 Herbert, 2 Pegler, 3 Morgan.

COLLEGE SERVANTS' RACE.—1 Weeks, 2 Baldwin, 3 Hall.

QUARTER-MILE OPEN.—1 Mott, 2 Murray, 3 Knubley ; time, 58½ secs.—Nine ran. Won by 8yds.

WALKING RACE, TWO MILES.—1 Poore, 2 Cooke, 3 Slater ; time, 19min. 54⅔ secs. Cooke led for 9 laps, when he was challenged by Poore, who won by 25 yards.

THROWING THE HAMMER.—1 Longeroft, 64ft. 4in. ; 2 Lyon, 60ft. 4in.—As the qualifying distance is 67ft., the prizes were withheld.

MILE OPEN.—1 Pryce, 2 Archer, 3 Riley ; time, 5min. 11⅔ secs.—Pryce won easily, a splendid race for second place. Nine ran.

SACK RACE.—1 Knubley, 2 Oswald.

HIGH JUMP.—1 Hopton, 5ft. 1in. ; 2 Cooke, 5ft.

HALF-MILE HANDICAP.—1 Mott 15yds., 2 Riley 5yds., 3 Ogilvy 30yds. ; time, 2min. 26secs.

TUG OF WAR.—In-students beat Out-students.

THE DONKEY RACE occasioned the usual amusement, although the number of mounts was fewer than usual. Mr. Radcliffe won the race, whilst the Hockey Girl, whose steed did not turn up at the post, was unanimously awarded the prize for costume. The following is the official card.

THE HOAX-Y STEAKS.

Open to all R.A.C. Students, except children in arms.

Distance: The same old course, of course. No Spurs, Fireworks, Kicking Straps or other Sedatives allowed.

Pace not to exceed 30 miles an hour, either backwards or forwards.

Motto for Riders: "Sit back and smile."

"An Ass! An Ass! My kingdom for an Ass!"

PROBABLE STARTERS.

Owners up, if not sent down.

<i>Owner.</i>	<i>Donkey.</i>	<i>Costume.</i>
Mr. RADCLIFFE'S ...	"Evan Roberts" ... "I thought I saw a Book maker With pencil in his fist, I looked again and found it was A Welsh Revivalist. 'If this should go away,' I said, 'I don't think he'd be missed.'" <i>Gas Works Record.</i>	Revivalist
Mr. SLINGSBY'S ...	"Bully Off" ... "Pretty petticoated Peter Skilled in all of Cupid's arts; When a man, he wins on horseback, When a girl, he wins our hearts." <i>Yorkshire Post.</i>	Hockey Girl
Mr. GANDARA'S ...	"Foreign Office" ... "There was a young student of Cadiz, Who was famed for his elegant grace; And he broke all the hearts of the ladies With his uniform, figure, and face." <i>Madrid Echo.</i>	Ambassador
Mr. HOPTON'S ...	"Breeks" ... "John Gilpin was a Citizen of credit and renown, He <i>hopped on</i> to his sturdy moke and cantered through the town. 'I'd pay a hundred crowns,' he cried, 'if I could but get down.'" <i>Home Chat.</i>	John Gilpin
Mr. SINGH'S ...	"Sahib" ... "Singh a songh of Sahibs From India's sunny clime; You couldn't find a donkey To take the prize from mine." <i>Ledbury Parish Magazine.</i>	Indian
Mr. SAMAZEUILK'S...	"Houp-la" ... "Moi j'aime dormir. Chantant m'amuse. Mangeant me plait et j'aime la danse. Ah! Mais j'adore ce gallant 'sport,' Honi soit qui mal y pense." <i>Rudyard Kipling's Bombay Ballads.</i> <i>Chansons de Sami.</i>	Huntsman

Mr. SNOWBALL'S ... "Old Nick" ... My Lady Nicotine
 "I bought this little donkey to be my very own ;
 I've got a *pullin'* animal and a *Pullan* gramophone."

Report of the Cirencester Exhibition.

Mr. PERO'S... "Wolf" ... Little Red Riding Hood
 "See this little girl in red, with hair in golden waves,
 Be warned in time by words of mine : ' Don't kiss
 her till she shaves.'"

Argentine Pierrot's Album.

Mr. W. OSBORN'S ... "Mother Earth" ... Farm Labourer
 "A ploughman, who came from Rhodesia
 Looked out for some work that was easier.
 Now a football he hustles
 With brawny great muscles,
 And you're killed if he happens to seize yer."

Cape Town Referee.

Mr. BURRA'S ... "Scullery" ... Kitchen Maid
 (*Entered by Telegram.*)

FROM THE MAN ON THE SPOT (HOMO-CEA).

Latest Scratchings:—

Mr. Archer's "Stroud Athlete."

Mr. Murray's "Apology" was entered too late to be accepted.

Prof. F. McClellan's "Inspection Pit" will not run.

Mr. Radcliffe's "Phantom Stud," by "Yarns," out of "Breath," has not yet arrived.

Mr. Henkel's "Petite Marie" has a swollen hock.

TIPS FROM THE TURF TOUT.

The following have arrived—

Mr. Russell Swanwick's brown thorough bread "Hovis."

Prof. F. McClellan's "Midnight Lectures."

Prof. Woodley's "Collar-bone," by "Gloucester Old Boy," out of "Joint."
 Now in good condition.

Mr. Archer's "Motor," by "Tinkering," out of "Order." Starts occasionally.

Mr. Cooke's "Ability" has lately been exercised on the Black Heath.

Prof. Locke's "Anemometer" has done some fast work during the week.

Prof. Paton's "Little Bubble Tube," by "Adjustment," out of "Horizontal."

R.A.C. POINT-TO-POINT RACES.

Stewards.—THE RIGHT HON. EARL BATHURST, C.M.G., M.F.H.

MR. H. O. LORD, M.F.H.

MR. T. BUTT-MILLER, M.F.H.

GENERAL SIR F. CARRINGTON, K.C.B., K.C.M.G.

Judge.—EARL BATHURST.

Clerk of the Scales.—MR. DE V. WOODLEY.

Clerk of the Course.—MR. R. STUART.

Starter.—MR. T. F. FORREST.

R.A.C. Committee.—T. CRAVEN, K. MCDIARMID, E. HOPTON,

A. RILEY, H. T. WATSON.

Secretary and Stakeholder.—A. P. SLINGSBY.

This popular meeting was held on Wednesday, March 15th, over the excellent hunting course again kindly placed at the disposal of the organisers by the Rev. J. Priestley Foster, Mr. R. H. Stuart, and Mr. T. Barton, at Woodmancote. The gathering largely owes its

origination and successful management to Mr. A. P. Slingsby, the honorary secretary, the master of the R.A.C. Beagles, who has in many ways done much to further the interests of sport in the College during his term of residence, and the fixture was looked forward to with pleasure by hunting men and farmers throughout a wide district in the V.W.H. and Cotswold Hunts. Unluckily, the morning was wretchedly wet, and this had the effect of materially reducing the attendance, but those who braved the elements were thoroughly rewarded, for the afternoon proved pleasantly fine, the rain keeping off till the last race, which finished in a vigorous downpour. Despite the unpropitious atmospheric conditions, there was a large and representative company present, including a fair proportion of ladies. The arrangements were similar to those of last year, and were excellently carried out, all the officials performing their duties to the general satisfaction. The weighing tent and winning post were located in a large field on the hillside overlooking Rendcomb Park, the starting point being in an adjacent field on the other side of the belt of beech trees. The course was over three miles of fair hunting country, including an appreciable proportion of plough, so that the going was fairly heavy. The route was indicated by flags fixed in the fences, which were all natural obstacles presenting no formidable features, and although falls were tolerably numerous, there was no very serious mishap either to man or horse, though Mr. R. H. Seymour had the misfortune to sustain a fracture of the collar bone. The ubiquitous "bookmaker" was in evidence, though not in very great numbers. The organisers of the meeting hospitably entertained a large company of farmers and other friends to an excellent luncheon, provided in a tent on the ground by Mr. E. J. Viner, of Cirencester. Mr. Slingsby presided, being supported by Earl Bathurst, master of the V.W.H. Hounds, and Mr. Herbert Lord, master of the Cotswold Hounds. At the close of the luncheon, Mr. J. M. White proposed Mr. Slingsby's health, as the main promoter of the meeting and chief founder of the feast, in a few genial words. The sentiment was enthusiastically honoured, and the Chairman made a hearty response, which was characterised by extreme brevity in the interests of the afternoon's programme.

R.A.C. CHALLENGE CUP. For present Students at the R.A.C. Three miles. Catch weights, over 12st. 7lbs.

Mr. A. P. Slingsby's Ballyhaunis	...	...	...	...	1
Mr. A. G. M. Wilson's Indian Queen	...	...	...	...	2
Mr. K. McDiarmid's Skyscraper II.	...	...	...	...	3
Mr. J. Popple's Jack the Ripper	...	...	...	...	0
Mr. H. T. Ward's Push Ball	...	...	...	...	0
Mr. T. L. Craven's Conachan	...	...	...	...	0
Mr. R. Radcliffe's Kenyon	...	...	...	...	0
Mr. F. de la Gandara's Flying Israelite	...	...	...	...	0
Mr. M. de la Gandara's Robert Diabolo	...	...	...	...	0
Mr. H. Treves-Watson's Kim	...	...	...	...	0

Flying Israelite and Jack the Ripper fell at the first fence, and Conachan refused. Indian Queen went away with the lead, but falling at the fifth fence out of the plough, Ballyhaunis was left in command, and though Indian Queen

was mounted and pluckily ridden in pursuit, she could not again get on terms, Ballyhaunis, who had been made a hot favourite, winning easily by ten lengths. Skyscraper II. and Push Ball made a good race of it for third place, the former getting just the better of the struggle, while Kim was fifth.

HUNT RACE. A Sweepstake of £1 each and Cup added, for horses, the property of, and to be ridden by Subscribers of not less than £5 to the funds of either of the V.W.H. or Cotswold Hounds. Horses to have been regularly hunted with any of the above packs. First prize, Cup and £11; second prize, Cup and £6. Flagged course, three miles. Catch weights over 13 stone. Owners up allowed 7lbs.

Mr. C. T. Craig's Blaize	...	...	...	...	Owner	1
Mr. J. T. Longworth's Dutch Bill	...	...	...	...	Owner	2
Captain the Hon. C. Gore Langton's Ruby IV.	...	...	...	...	Owner	3
Mr. W. C. Unwin's Post Boy	...	...	...	...	Owner	0
Mr. R. R. Barker's Alice	...	...	...	...	Owner	0
Mr. H. Barker's British Flag	...	...	...	Mr. Seymour	0	
Mr. J. J. Powell's Nothing II.	...	...	...	...	Owner	0
Major M. R. F. Courage's Lax	...	...	...	...	Owner	0
Mr. G. B. Metcalfe's Ducky	...	...	...	...	Owner	0
Captain J. Talbot's Calm	...	...	...	...	Owner	0
Mr. J. D. Gouldsmith's Likely Girl	...	...	...	...	Owner	0
Mr. A. Barrett's Susan	...	...	...	...	Owner	0

The race was well ridden, and at a good pace. Likely Girl jumped off with the lead from Dutch Bill and Alice till the third fence was reached, when British Flag and two others fell, Mr. Seymour, the rider of British Flag, fracturing his collar bone. Alice then drew in front of Dutch Bill, but out in the country the latter took command, and held it till three fences from home, when Blaize and Susan came to the front in close company. At the last fence Susan fell, leaving Blaize a comfortable winner by three lengths from Dutch Bill, Ruby IV. being third, half a length behind.

FARMERS' RACE. For horses hunted with either of the V.W.H. and Cotswold Hounds during the present season, the property of *bona fide* Tenant Farmers residing in the Hunts named, to be ridden by them, their sons, or subscribers to the Hunts. Winner, 12 sovs.; 2nd, 3 sovs.; 3rd, 2 sovs. Catch weights over 13 stone; distance, three miles; flagged course. Owners up allowed 7lbs. Farmers over whose land the R.A.C. Beagles have hunted were also eligible for this race.

Mr. R. H. Cole's Andriana	...	...	...	Mr. E. Brain	1
Mr. R. Rickards' Red Sea II.	...	...	...	Mr. H. W. Habgood	0
Mr. H. Whiteman's Cookham	...	...	...	Owner	0
Mr. W. T. Stevens' Lady Ranbury	...	...	...	Owner	0
Mr. J. Clem Barton's Little One	...	...	...	Owner	0
Mr. M. N. Cole's Country Girl	...	...	...	Owner	0

Lady Ranbury led the way for nearly half the journey, but could not keep up the pace, and resigned the command to Little One, which had been lying second. Three fields from home Cookham forged to the front, and finished three lengths in front of Little One, with Red Sea II. third, Country Girl fourth, and Lady Ranbury fifth. Andriana finished last, and an objection by her rider that the others had not run the course, having gone the wrong side of the flag, was upheld, and she was awarded the race, no second or third being placed, as no other had covered the distance. An offer to run the race again was not taken advantage of.

OPEN RACE. A Sweepstake of £1 10s. each, and Cup added to the winner. The winner £10 and Cup, and the second £5. Open to horses that have been hunted regularly this season with any Pack of Foxhounds. Distance three miles, flagged course. Catch weights over 13 stone.

Mr. C. Strickland's St. Emo. .	...	...	Mr. J. T. Longworth	1
*Miss Morris's Lamia...	...	...	...Captain H. Jay	2
Mr. G. B. Metcalfe's War Cry	...	...	... Owner	3
Mr. A. Barrett's Hampton Vine	...	...	... Owner	0
Mr. S. Annandale's Slingsby	...	...	... Owner	0
Mr. F. Luker's Sandmartin	...	...	... Owner	0
Mr. H. Unwin's Rosina	..	...	... Owner	0

* Entered by telegram and not confirmed.

St. Emo went off with the lead, holding it throughout, and never being challenged won in a canter by seven lengths. Half a length between second and third.

OLD STUDENTS.

Mr. Bruce Swanwick, M.R.A.C., read, on March 20th, before the Cirencester Chamber of Agriculture, an interesting and instructive paper on "Rural Bye-laws in relation to Cottage Building." The paper gave rise to an interesting discussion on the subject.

We have received from Mr. G. Bisdee some interesting particulars of Tasmanian farming. He farms some 20,000 acres, on which he has 9,000 Merino sheep and 250 Devon cattle. The latter, he states, are peculiarly suitable for the conditions prevailing. Shropshire sheep are coming much into favour for the frozen meat trade. Prices are, according to our ideas, somewhat low, *e.g.*, wheat 12s. per quarter, potatoes 30s. per ton, sheep 4s. 6d. a head. The climate, which he praises highly, is somewhat changeable, but long droughts, as on the Australian mainland, are unknown. He would be glad to give any information to College men thinking of settling in the above colony.

Mr. Alexander Goddard, M.R.A.C. (1888), Gold Medallist, lately Private Secretary to the President of the Board of Agriculture, has been elected to the important post of Secretary of the Surveyors' Institution, in succession to Mr. Julian C. Rogers, who is retiring after many years hard and successful work at the post.

Mr. Pierce De L. O'Mahony, M.R.A.C., Haygarth Gold Medallist, 1875, formerly M.P. for North Meath, is now working at the Orphanage of St. Patrick, Sophia, Bulgaria, and will be glad to receive assistance, financial or otherwise, from Old Students or friends. The orphanage is strictly non-political and non-sectarian. We understand that Mr. Mahony was one of the originators of this magazine.

APPOINTMENT.—We note that Mr. James Hendrick, B.Sc., F.I.C., formerly assistant to the Professor of Chemistry, and now Lecturer on Agricultural Chemistry at Aberdeen University, has been appointed Consulting Chemist to the Highland and Agricultural Society of Scotland in succession to the late Dr. Aikman.

OBITUARY.

We regret to record the death of Don Pedro de Bertemati y Pareja, Associate of R.A.C. (August, 1902), of Jevéz, Spain, on the 14th January, 1905. *Ætat*: 22.

We regret to record the death of Herbert Curwen, M.R.A.C. (1883), which occurred at Coleford, Gloucestershire, on March 14th. *Ætat*: 53. Quite recently Mr. Curwen had shown his interest in the College, by presenting a large number of photographs taken by himself in the Forest of Dean, illustrating various phases of Forestry and Charcoal burning. He took an active part in educational matters, especially technical education, in the Forest of Dean.

It is with deep regret that we record the death of Edward Charles Ozanne, M.R.A.C. (April, 1883), at Guernsey, on January 28th. *Ætat*: 54. He died suddenly after an operation. Mr. Ozanne entered the Indian Civil Service in 1870 on the Bombay Establishment, and retired from the Service in 1897. Whilst in India he filled several important posts and rendered special services. From 1873 to 1881 he was Assistant Collector and Magistrate, and was on special famine duty in Bengal in 1874, in Bombay in 1876 and 1877, in Mysore in 1877 and 1879, and in Kathiawar in 1879. In 1881 he joined the R.A.C., receiving special prolongation of leave and other facilities from the Indian Government to enable him to take the entire course and the Diploma, which he did with great credit, being second only to a distinguished Indian Student, A. C. Sen. Whilst at the College he endeared himself by his sterling and genial qualities to the members of the Staff and to his fellow Students, whom he was always ready to help both in their work and their play. He was in the Cricket XI. in 1882. On his return to India in 1883, Mr. Ozanne was made Director of Agriculture for the Bombay Presidency, which position he held till 1891 when he became Survey and Settlement Commissioner, and in 1893 Survey Commissioner and Director of Land Records and Agriculture. On his retirement in 1897 he went to live in his native island, Guernsey, of which he was at once elected a Jurat of the Royal Court, and afterwards a State Supervisor. In 1900 he became President of the States Education Committee and last year President of the Finance Committee. Mr. Ozanne was appointed by the India Office to represent India in the British delegation to the International Sugar Bounty Conference at Brussels in 1898, and again in 1901 and 1902. When the permanent Sugar Commission was appointed in 1902, as a result of the Conferences, Mr. Ozanne was nominated as Assistant Delegate for Great Britain, and for his valuable work in this connection as well as in other ways for the Empire, he received the Order of Companion of the Star of India in 1902. Whilst at the R.A.C., he became a Life Member of the Royal Agricultural Society—by examination. Among his numerous official reports the most important is the Bombay Statistical Atlas, issued in 1886, a mine of

information respecting the liability to famine of the various districts and taluquas of Western India. Mr. Ozanne was a Consulting Member of the Board of Studies of this College. Whilst at the College, and throughout his all too short life, he exercised a marked influence for good on those with whom he came in contact. He is deeply mourned in Guernsey, and will be greatly missed there in his important public capacities, the duties of which he always carried on with ability and zeal. In all matters connected with education, sanitation, and finance his opinion carried the greatest weight.

FARM NOTES.

During the past winter months, two cross-bred heifers were fattened at our steading. One was an Aberdeen Angus and Shorthorn cross, the other Aberdeen Angus and Hereford. Both purchased from James Joicey, Esq., Poulton Priory, at £14 each, equal to 32/- per cwt. live weight. They were kept twenty weeks and gained during that period 2 cwt. each. They were fed on decorticated cotton cake, maize meal, roots, hay, and chaff, at an estimated value of 6/- per week. When sold at 11/6 per score they weighed 21 cwt. 2 qrs. 7 lbs. live weight, the carcase weight being 71 score 12 lbs., equal to 60 per cent. They realised 38/3 per cwt. live weight. In this case the increase in live weight cost £3 per cwt., so that the net profit was very little.

The small flock of sheep kept for the purpose of illustrating the different breeds, has been increased by the purchase of Southdowns from Earl Bathurst, and Hampshires from A. Apperly, Esq., Stroud.

Pure-bred pigs of the Large White, Middle White, and Large Black have been purchased for fattening purposes. It will be interesting to note which give the best results as bacon pigs.

A Red-Poll cow has been added to the Dairy herd from Garratt Taylor, Esq., Norfolk. The two Ayrshires bought last year gave over 700 gallons each during their milking period. The total herd of cows averaged over 600 gallons each.

CHLORINE IN RAIN WATER.

The rainfall for the six months ending September 30 was 14·67 inches, it fell on 83 days, and contained on an average chlorides equivalent to 2626 grains of sodium chloride per gallon: the total fall containing the equivalent of 12·38lbs. of common salt per acre.

For the twelve months ending the same date the total rainfall was 35·36 inches, on 203 days, and it contained chlorides equivalent to 38·72lbs. of common salt per acre.

E. K.

INDUSTRIAL AND LOAN EXHIBITION.

This successful exhibition was held during February at the Corn Hall. Besides an interesting and instructive exhibition of arts and crafts, various lectures and entertainments were given every evening. Of interest to those connected with the R.A.C. was a lecture on "The Agricultural Possibilities of Rhodesia," with an exhibit of agricultural and other products. Among past and present members of the College who gave their assistance in making the exhibition a success, were Mr. Walford, whose histrionic talent was displayed to great advantage in the "Pantomime Rehearsal," given on two nights, and Messrs. Cooke, Addison, Barker, and Trier, who took prominent parts in the series of tableaux vivants given for three evenings. Messrs. Walford, M.R.A.C., and Annesley Cooke were exhibitors of artistic work, and Professor E. Kinch was a member of the Working Committee.

FOOTBALL.

RUGBY.

The following represented the R.A.C. XV. :—Back, McDiarmid ; three-quarters, Cooke, Vernon, Murray ; halves, Barker, Bullock ; forwards, W. Osborn, A. Osborn, Archer (captain), Trier, Longcroft, Ogilvy, Chell, Knubley.

CHARACTERS OF THE XV.

McDIARMID.—Has played a very useful game at full back.

COOKE.—Runs strongly when he gets a chance and kicks well. Better on defence than on attack.

MURRAY.—Fast, but light ; not quick enough in handling the ball. .

BARKER.—Very useful, but light. Should attend to the game instead of exhausting himself in giving instructions.

OSBORN, W.—A very good hardworking forward. Heavy and a good scrummager.

OSBORN, A.—A good forward, especially in the loose. Perhaps the best tackler in the team.

LONGCROFT.—A good forward with plenty of dash. Works well in the scrum.

TRIER.—A good scrummager. Packs well, and assists largely in keeping the forwards together.

ARCHER.—A fast forward. Works hard both in the scrum and in the loose, and is one of the few forwards who can follow up to advantage.

BULLOCK.—Good three-quarter. Handles and passes cleanly ; kicks well into touch. Has played half.

CHELL.—Hard-working forward. Good in the loose.

VERNON.—A somewhat uncertain three-quarter. Should learn to collar low and without hesitation. Has played full back.

KNUBLEY.—Light forward. Has greatly improved. Will be better when he has learnt more about the game.

OGILVY.—Fast hard-working forward. Tackles well.

Also played.

MATHIAS, TURNER, MATHEWS, B. SWANWICK, ANDERTON, and MANKOWSKI.

R.A.C. v. BERKSHIRE WANDERERS A.—Played at Cirencester, February 8th, resulting in a pointless draw after a fairly good game. The College being

without the services of Anderton, Matthews, and Mankowski, failed to show the dash which characterised the XV. of last session. The game was principally confined to the forwards, the backs having little opportunity of distinguishing themselves. Cooke had bad luck in not scoring in the second half. Osborn and Archer showed up amongst the forwards. The following represented the R.A.C. : Back, McDiarmid ; halves, Murray and Barker ; three-quarters, Cooke, Ward, Bullock, and Swanwick ; forwards, Archer (captain), A. Osborn, W. Osborn, Ogilvy, Longcroft, Trier, Burra, Knubley.

R.A.C. v. MAGDALEN COLLEGE, OXFORD.—This match was played at Oxford on February 15th, and resulted in a win for Magdalen by 6 points to nil. The R.A.C. were one forward short. There was no scoring in the first half of the game, but in the second half one of the Magdalen halves scored twice within five minutes. Bullock made a good attempt at a drop goal, but without success. The forwards held their own ; the backs, however, were rather outmatched in point of speed by their adversaries. The following represented the R.A.C. :—Back, Vernon ; half-backs, McDiarmid and Murray ; three-quarters, Cooke, Swanwick, Watson, and Bullock ; forwards, Archer, Longcroft, A. Osborn, W. Osborn, Trier, Ogilvy, and Knubley.

R.A.C. v. ST. PAUL'S COLLEGE, CHELTENHAM.—Played on February 25th at Cirencester, resulting in a win for St. Paul's by 5 points to 4. The game was a well contested one, Matthews, Anderton, and Mankowski playing for the R.A.C. The former scored a magnificent goal from a mark of McDiarmid's just over the half-way line. In the second half St. Paul's scored and converted a try. The following represented the R.A.C. :—Back, McDiarmid ; halves, Matthews and Murray ; three-quarters, Mankowski, Swanwick, Bullock, and Vernon ; forwards, Archer, A. Osborn, W. Osborn, Anderton, Longcroft, Trier, Ogilvy, and Knubley.

R.A.C. v. GLOUCESTER OLD BOYS.—Played at Gloucester on March 4th. This match resulted in an easy win for our opponents by 22 points. Although we defeated this team by a narrow margin of two points earlier in the season, we were completely outmatched in this game, in spite of the fact that the Old Boys were two forwards short. The following represented the R.A.C. :—Back, McDiarmid ; halves, Murray and Barker ; three-quarters, Cooke, Bullock, Swanwick, and Vernon ; forwards, Archer, A. Osborn, W. Osborn, Longcroft, Trier, Murray, Knubley, and Ogilvy.

R.A.C. v. SWINDON.—Played at Cirencester on March 18th, resulting in a win for Swindon by 3 points. The College forwards pressed their opponents, but in spite of smart heeling from the scrum, the state of the ground rendered scoring difficult. A mis-field by McDiarmid resulted in a try for Swindon. Play towards the end of the game became somewhat rough. The following represented the R.A.C. :—Back, McDiarmid ; half-backs, Barker and Bullock ; three-quarters, Cooke, Murray, Swanwick, and Vernon ; forwards, Archer, W. Osborn, A. Osborn, Trier, Chell, Knubley, Ogilvy, and Turner.

GOLF.

This term has seen the golf course very well patronised. The first items of interest were the single and double tournaments. The final for the former between Mr. W. F. Mott and Mr. K. McDiarmid has yet to be played. Messrs. C. A. Cooke and G. Lyon annexed the latter.

The College Challenge Cups were played for on Saturday, March 18th, under beautiful weather conditions, and resulted as follows :

SENIOR.					
1. Professor Paton ...	...	...	78	—	scr. = 78
2. Mr. G. Stoddart ...	...	...	89	—	10 = 79
3. Mr. K. McDiarmid ...	...	...	83	—	3 = 80
4. Mr. C. A. Cooke ...	...	...	90	—	8 = 82

5.	Mr. G. E. Cranstoun	...	...	91	—	6	=	85
	Mr. G. Lyon	...	...	93	—	8	=	85
7.	Professor Blundell	...	...	91	—	4	=	87
8.	Mr. Ogilvy	...	...	110	—	7	=	103

JUNIOR.

1.	Mr. W. Osborn	...	...	104	—	22	=	82
2.	Mr. R. Swanwick	...	...	111	—	25	=	86

On Wednesday, March 29th—a perfect golfing day—the R.A.C.G.C. played Sapperton Park G.C. on the College links, the match resulting in a win for the home team by 6 matches to 4.

R.A.C.

Professor Paton	...	...	0
Mr. E. B. Haygarth	...	...	0
Mr. K. McDiarmid (captain)	...	1	
Mr. W. F. Mott	...	...	1
Professor Blundell	...	...	0
Professor Locke	...	...	0
Mr. G. E. Cranstoun	...	...	1
Mr. F. de la Gandara	...	...	0
Mr. G. Lyon	...	...	0
Mr. G. Stoddart	...	...	1
Mr. C. A. Cooke	...	...	1
Professor West	...	...	1

Total 6

SAPPERTON PARK.

Mr. C. O. H. Sewell	...	...	0
Mr. J. Rawlins (captain)	...	...	1
Mr. H. St. G. Rawlins	...	...	0
Mr. E. C. Cripps	...	...	0
Mr. W. G. Tovey	...	...	1
Mr. R. J. Mullings	...	...	1
Mr. W. W. Dobson	...	...	0
Mr. W. H. Cole	...	...	0
Mr. H. Boulton	...	...	1
Mr. A. Stradling	...	...	0
Mr. W. Wearing	...	...	0
Mr. W. Parry	...	...	0

Total 4

A return match has been arranged at Sapperton Park, on Saturday, April 8th.

BILLIARDS.

The following gentlemen entered for the American Billiard Handicap of 200 up :—

Prof. Paton ... scr.	H. H. Beardsley	} 45	H. C. Turner	} 75
Prof. West ... } 10	W. F. Mott ...		H. F. Bullock ...	
Prof. Locke ... } 20	H. C. Bell ...	50	J. Galvez ...	} 80
G. Lyon ... 30	B. J. Però ...	65	H. Vernon ...	
H. Bernal ... 30	A. Sasson ...	} 70	J. Popple ..	} 85
J. Poore ... } 40	A. Rheingantz ...		R. Samazeuilk ...	
C. Kearton ... } 40	L. W. de Soysa ...		T. T. Pryce ...	90

First prize, H. H. Beardsley ; second prize, C. Kearton ; Prof. Locke and Popple tied for third prize, and Prof. Locke scratched in favour of Popple.

REVIEWS.

THE MANURING OF GRASS LAND. Lessons from Rothamsted. By A. D. Hall, M.A. London : W. Conquest and Co., 1905. Pp. 16. 3d.

The talented Director of the Rothamsted Experimental Station has done a very useful and kindly deed in writing this little pamphlet containing some of the main lessons to be learnt from the manuring of grass land at Rothamsted, and pointing out their application to the general practice of the farm. We hope that this is only the first of a series of such pamphlets from the same source, for hitherto the lessons from Rothamsted have filtered down all too slowly to the farmer in this land ; they have been more quickly appreciated and applied in other countries. The experiments began in 1856 on old park land, so we are now in the 50th year of the experiments, and the results are thoroughly tested and

proved. The British farmer depends on his grass land more than on all his other crops together, and too often treats it with scant respect, expecting it to yield good crops even when it has been scurvily treated. Mr. Hall illustrates the results with pictorial diagrams and adds hints drawn from his experience and observations in other localities, so that few farmers can fail to be benefited by reading these few pages, if they only put their acquired knowledge into practice. We note also that *Farmers* may obtain copies, *gratis*, from the printers and publishers, W. Conquest and Co., Tottenham, London, N., so no excuse for want of knowledge now remains.

SCHLICH'S MANUAL OF FORESTRY. Vol. III. FOREST-MANAGEMENT. 3rd Edition. W. Schlich, Ph.D., F.R.S., Honorary Professor of Forestry, R.A.C.

The greater part of this volume deals with working-plans: the earlier portion with the measurement of timber and woods. It contains some improvements compared with the earlier edition, amongst which may be mentioned the inclusion in the appendix of some yield tables for the principal forest trees, and those have been selected which the author considers suitable for use in this country. Parts of the volume are, as in the first edition, highly technical, and while it should prove of value to those who may have the management of large forest areas, or those who may have the charge of several estates, and be allowed to manage the woods on them as a collective whole, yet to the ordinary manager of woods in this country, whether land agent or head forester, especially in cases where he acts for a life-tenant only, the work will not be of such practical value as the two first volumes of the manual. To anyone, however, whose lot it may be to show others how to make a working-plan, simple or otherwise, the appearance of this new edition is of great interest, though we should have liked to have seen included in the appendix an example illustrating the author's own ideas as to the form that a working-plan for the woods on an English estate should take.

A MONOGRAPH OF THE BRITISH DESMIDIACEÆ. By W. and G. S. West. Vol. I., pp. xxxvi., 224. With 32 plates. London: The Ray Society, 1904. Price 25s. net.

Since the appearance of that classical volume, "*Ralfs' British Desmids*," in 1848, only one attempt has been made to collect together all that is known concerning the British forms of these beautiful microscopic plants. In 1886 Cooke issued a book on "*British Desmids*," which was of a most unsatisfactory nature. It included descriptions and figures of about 270 species, but was very little of an advance on Ralfs' publication, and both text and illustrations were very defective. During the past twelve years the authors of the present monograph have been largely occupied in working out the distribution of these plants in various parts of the British Islands, the number of known British species being now about 700. A general account of the structure, reproduction, and occurrence of Desmids is given in the introduction, together with the best methods of collecting, preserving, and examining them. The main part of the book is a systematic account of the various species and varieties, with careful descriptions and measurements, to which is added under each species its known distribution in the British Islands and its geographical range. Great care has been expended on the illustrations (many of which are coloured), as in plants which exhibit such great diversity of form accurate figures are almost essential for the determination of species. The work is to be completed in five volumes. The Ray Society is to be congratulated on securing the services of Mr. W. West and his talented son, the Professor of Natural History of this College, whose wide and accurate knowledge of these unicellular plants is well known. The authors have done their part of the work well and thoroughly, and the Society's part, in the reproduction of the plates and the printing, leaves nothing to be desired.

R.A.C. OLD STUDENTS' CLUB.

We publish a list of the Members of the "Old Students' Club," and hope that any errors in names or addresses will be made known to the Editor. The Principal and Staff are eligible as members. We hope that a larger number of old members of the College and Staff will join the Club, and attend the annual meeting and dinner, which is held in London during the Royal Agricultural Show week.

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BOTANIC GARDENS, R.A.C.

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FORESTRY: IN THE PAST AND IN THE FUTURE.

For many years up to 1662 the scarcity of timber had so alarmed the Commissioners of the Navy that they asked the Royal Society (which had then not long been constituted) to propose a remedy, the result being John Evelyn's paper, afterwards expanded and published in 1664 under the title of "Sylva, or a Discourse of Forest Trees." This book went through several editions and induced many landowners, such as the Dukes of Portland and Bedford among others, to form oak and other plantations of timber trees. Later on towards the end of the 18th and early in the 19th century, large plantations of conifers were made in Scotland by the Duke of Athole, the Marquis of Breadalbane, and Sir J. Grant of Strathspey, and other noblemen and gentlemen. Subsequent to 1830 there appears to have been a cessation of activity in planting. For this several causes are apparent. There was at the time a great depression in the prices of agricultural produce, that led to reductions in rents and shortness of money among the landed proprietors. Railways also were commencing to attract notice as an outlet for investment, the use of iron in shipbuilding, of coal and coke for fuel and smelting purposes, and the free importation of timber and bark from the Continent of Europe and from America, all tended to the restriction of woodlands, until they have now become mainly game preserves and ornamental features of large landed estates. Finally it was found in too many cases that the sanguine anticipations formed of future profit were seldom realised.

In the last 20 or 30 years interest in forestry has been revived by the scarcity of timber of good quality, and by the increase in its value owing to the reckless exploitation of the forests of Norway and the North American Continent; but, at the same time, English landowners are as a rule a more or less impoverished class, owing to the heavy fall in the value of agricultural land, and are unable or unwilling to incur large expenditure of any kind without some assurance that they are making an investment for the benefit of their successors.

Perhaps there is no subject in which it is more difficult to reconcile theory and practice than in that of agriculture, but the effects of agricultural operations are easily ascertained within a comparatively short period, while in the closely allied art of forestry the results are so long deferred that few men who plant a crop can expect themselves to reap the harvest.

It is therefore of the greatest importance that some guide in the form of accurate statistics of yield should be available in order that a

landowner may have something to show him that money expended in creating plantations will not only not be wasted but will constitute a sound income-producing investment for the benefit of himself and his successors. Unfortunately such statistics relating to forest growth in Britain are non-existent, and landowners have in the past been induced to sink their money in what have, in too many instances, proved utterly unremunerative plantations on the faith of wild and fictitious calculations based on hypothetical data. Financial balance sheets, showing apparently reasonable estimates of expenditure and income, have been made out that in practice have proved absolutely unreliable.

Even Government Departments are liable to be led astray in their planting operations, as is shown by the well known instance of the Knockboy Plantation in Connemara, which was acquired by the Irish Government in 1890. The estate, consisting of 960 acres, was first placed under the Irish Land Commission, and subsequently under the Congested Districts Board, and by 1894 about half a million broad-leaved trees and nearly two million conifers had been planted. By 1895 most of the former were dead or dying, and the latter in little better plight. By 1898 it was decided not to incur any further expense in planting, the total outlay on this complete failure having been upwards of £10,500. If a Government Department, having the services of experts at command, is led into a disastrous enterprise of this kind it may well be asked how the private landed proprietor can expect to fare.

The absurdity of calculations that assume a tree will grow to a certain size in so many years, and that an acre will carry a certain number, is amusingly described in a cheery book (one of the old Jorrocks series), called "Plain or Ringlets?" Here an old naval officer is portrayed as having read a book on planting, written by a certain "Daft 'un," and having been induced by it to plant a property with oak trees on the assumption that each would be worth so much money in so many years, the result on paper being that for an expenditure of a few thousand pounds he would shortly net three-quarters of a million. It is needless to say that these hopes were disappointed, and, in fact, the trees refused to grow on the selected situation. Even in the 20th century this method of calculating does not appear to have become obsolete. In an essay on the "Management and planting of British Woodlands,"* published in 1903, we are given the following data, which are said to be "*not hypothetical except in the assumption of a full crop*," a very important reservation.

Oak	130 to 150 years	100 trees per acre	quantity 8,000 to 10,000 cubic ft.
Ash	80 years ...	150 " "	" 5,000 to 7,000 "
Beech	80 years ...	100 " "	" 8,000 "
Scots Pine	112 to 120 years	300 " "	" 9,000 to 10,000 "
Larch	80 years ...	300 " "	" 10,000 to 12,000 "

In order apparently to show the moderation of these figures we are given an illustration of a Scots pine plantation, "on a very poor

* Journal of the Royal Agricultural Society of England, vol. 64.

soil," 30 to 40 years old, 900 trees per acre containing 8,500 to 9,000 cubic feet.

From these figures we may turn to the continental yield tables, by Baur, Schuberg, Lorey, and Weise, for beech, silver fir, spruce, and Scots pine, which have no reservation whatever except that they are for trees grown on soils of the best quality for the respective species, in pure forests, and in close canopy, that is, under the conditions that have been proved to produce the best financial results. These yield tables are very clearly collated in Dr. Nisbet's very useful book, "British Forest Trees," to which those interested in the subject should refer, as it is impossible to quote them in detail, but, converting them into our English quarter girth measure, omitting bark and small branches that are included in Continental measure but excluded in Britain, we find that as regards beech at 80 years there should be an average of 328 trees per acre, containing 5,607 feet (quarter girth); and for Scots pine at 120 years there should be 141 per acre, containing 6,612 feet.

This shows how different is the system of forestry here and on the Continent, when an authority at home suggests that with pure beech at 80 years there should be 100 trees per acre (say 21 feet apart), abroad there will be 328 trees (say 11 feet 6 inches apart). So also with Scots pine, for while we are told of 300 stems per acre in Britain at 112 to 120 years (12 feet apart), Weise gives us 171 stems per acre (16 feet apart) at 100 years, and 141 ($17\frac{1}{2}$ feet apart) at 120 years, and ascertains the average crop per acre to be 6,612 feet at the latter age against 9,000 to 10,000 feet to be reaped according to the British authority.

These are specimens of the hypothetical data that have discredited British foresters and their conclusions for the last century, and have done much to prevent the extension of woodlands. In his very interesting and instructive little book, "Forestry in the United Kingdom," Dr. Schlich has amplified the lecture he gave on the occasion of his visit to the Royal Agricultural College in November, 1903, and estimates the final crop of the respective species as follows, having based his calculations on Continental yield tables adapted to the conditions obtaining in Britain :—

Oak	130 years	4,070 feet
Ash	70 years	2,100 feet
Beech	120 years	4,000 feet
Scots Pine ...	80 years	4,300 feet
Larch	70 years	3,900 feet

Dr. Schlich estimates that under these rotations we may count on an average production in the way of timber as follows :—Ash, about 40 cubic feet per annum; oak, about 40 cubic feet; beech 57, Scots pine 70, and larch 73 cubic feet per annum. Putting the prices at 1s. 6d. a foot for oak and ash, 1s. for larch, 9d. for beech, and 6d. for Scots, the gross return shown per acre per annum is: larch, 73s.; oak, 69s.; ash, 60s.; beech, 43s.; and Scots, 35s. Presumably these

are for best soils for the respective species, certainly none but the most suitable soil, such as we find on the old red sandstone in Herefordshire, would grow oak to produce this result.

An admirable essay has been recently published, written by Mr. A. C. Forbes (who has practical experience gained as Forester at Bowood and Longleat, and who is now Lecturer on Forestry at the Armstrong College, Newcastle-on-Tyne) on "The Adaptation of Land for Afforestation." He there says: "When larch is grown pure and cut at 50 or 60 years of age fairly heavy yields may be expected at the final felling, 3,000 to 4,000 cubic feet per acre, worth about £150 to £200. Scots pine at 80 years of age may contain 5,000 feet and be worth £100 to £150 if a ready sale exists. For such yields and returns good soils and situations are needed, and good markets must exist."

Mr. Forbes also gives the following suitable rotations, and average yields per acre and per annum of the following species:—

	Rotation.			Yield.			Average Price.
Scots Pine ..	70 to 100	years	...	30 to 60	feet	...	4d. to 8d.
Larch ...	40 to 80	"	...	40 to 60	"	...	9d. to 1/-
Oak ...	80 to 120	"	...	20 to 40	"	...	1/- to 2/-
Ash ...	60 to 80	"	...	30 to 60	"	...	1/3 to 2/6
Beech...	70 to 100	"	...	40 to 80	"	...	6d. to 1/-

The lower rotations and smaller yields applying to the worst, and the larger and higher to the best situations.

Although it may be admitted that rotations in Britain are, or may be, shorter owing to our moist insular climate, and for this reason we are able to grow trees in more open canopy than is possible on the Continent, these rotations are still of such a length that the interest on the money expended in the initial outlay mounts up to a very large sum of money by the date of realisation, and, although the acreage returns appear considerable, they do not in reality amount to more than about 3 per cent. per annum on the capital employed. Why, then, it will be asked, should British landowners plant their estates with forest crops if they can only expect this rate of interest from their investment? The answer is that well designed plantations give an estate a far greater value than the saleable value of the timber. Considerations of shelter and of sport, as well as landscape, make plantations an important factor in the value of a landed estate, while woodlands afford winter occupation for the rural population at a time when employment is slack on agricultural land. For these reasons at all events planting should be continued on the landed estates of Britain, and particularly on those that lie high and exposed, and of which the value as agricultural land is low. Everything goes to show that the values of timber must appreciate, and that plantations that are carefully designed, planted, and, what is of the highest importance, properly tended, will prove a better investment in the future than in the past, besides preserving and extending the area of our woodlands, which are among the most beautiful features of our English landscape.

ROBERT ANDERSON, F.S.I.

THE EVOLUTION OF THE COUNTRY BOOK.

Time was when the description of things pastoral was deemed the province of the poet, and between Hesiod and Thomas Tusser such authors as were moved to write of country sights and sounds generally did so in verse. But since Francis Bacon's essay in praise of gardens, a taste for prose dealing with all manner of country pursuits has been growing steadily among the English speaking races. And one may say that this predilection has of late years become a positive craze, for to look at the half-yearly list of any well-known publisher is to be confronted with innumerable books that deal directly with the country: either in the pleasantly practical fashion of Miss Jekyll and the late Dean Hole, or in the wittily discursive vein of Elizabeth the inimitable.

We of the Cotteswolds possess more than one such recent book descriptive of our own country-side, and no one who sojourns ever so short a while in our dear Cotteswold country should forego the pleasure of reading Mr. Gibbs' delightful "Cotteswold Village," a picture of Bibury and its neighbourhood as accurate as it is intimate and loving, and in itself a perfect storehouse of information, quaint character, and general pleasantness.

Probably the first "Garden Books" of all were written by Carl Linné, who—to quote Richard Jefferies, another country lover living some century later, "touched nature with his fingers instead of sitting looking out of the window"—was perhaps the first man who had ever done so for seventeen hundred years.

Following Linnaeus comes one, who if less famous is more familiar, Gilbert White. He immortalised the little Hampshire village where he spent his busily observant days: at that time, however, he was a bright exception, for we find Richard Jefferies in the middle of last century lamenting "so many, many books, and such a very, very little of nature in them! Though we have been so many thousand years upon the earth we do not seem to have done any more as yet than walk along beaten footpaths, and sometimes really it would seem as if there were something in the minds of men quite artificial, quite distinct from the sun and trees and hills—altogether house people, whose gods must be set in four-cornered buildings."

An interest in archæology, folk-lore, and agriculture is no new thing, and the Cotteswolds are rich in historians of the kind—witness Rudder, Bigland, and Rudge.

Only the other day I came across a curious old book in verse wherein a band of poets—among them Drayton, Ben Jonson (here spelt Johnson), and Heywood all write verses in celebration of the yearly meeting on Dover's Hill, near the old market town of Chipping Campden. It rejoices in the somewhat stately title of "Annalia Dubrensia, upon the yearly celebration of Mr. Robert Dover's Olimpick Games upon Cotswold Hills." These "Olimpick Games" seem to have been of an exceedingly varied character, for in the forefront of this book there is a "cut" representing the sports "as

men playing at the cudgels, wrestling, leaping, pitching the bar, throwing the iron hammer, handling the pike, leaping over the heads of men kneeling, standing upon their hands, etc., also the dancing of women, men hunting and coursing the hare with hounds and greyhounds, etc.: with a castle built of boards on a hillock with guns therein." Truly a most comprehensive cut! In Wood's "Athenæ Oxoniensis" there is a description of the games and also of the book, which runs as follows:—

"This book which hath the running title on every page of Cotswold Games consists by (*sic*) verses made by several hands on the said Annalia Dubrensia. The said games were begun and continued at a certain time in the year for forty years, by one Robert Dover—who being full of activity, and of a generous free and public spirit did with leave from King James the First, select a place on Cotswold Hills, in Glostershire, where the games should be acted.

"Endimion Porter Esqre, a native of that county and a servant to that King, a person also of a most generous spirit, did, to encourage Dover give him some of the King's old cloaths, with a hat and feather and ruff, purposely to grace him, and consequently the solemnity. Dover was constantly in person well mounted and accoutred, and was the chief director and manager of those games frequented by the nobility and gentry (some of whom came sixty miles to see them) even till the rascally rebellion was begun by the presbyterians and spoiled all that was generous and ingenious elsewhere."

The verses, except from an antiquarian point of view, are not very interesting. There are the usual "dialogues" full of classical allusions, an "Annagram," an "Achrosticon," a ten-line "Epigram" by Ben Jonson, assuredly not in the poet's happiest vein, and various poems long and short. All are equally eulogistic of the worthy gentleman to whom they are addressed, and Michael Drayton in the first line of the first poem strikes the key-note, which is sustained throughout the rest, "Dover to do thee Right, who will not strive."

Indeed the jovial Robert seems to have been an entirely good-natured and peace-loving gentleman, for although he "was bred an attorney he never try'd but two causes having always made up the Difference." It is pleasant to think of the kindly and simple-hearted "heroic Dover" ruffling it in King James's old clothes—did they fit I wonder?—and there is no doubt that for many years his Olimpick Games were what our modern newspapers would call "an important and fashionable function" in Gloucestershire. For in spite of the presbyterians the games seem to have continued to take place with fair regularity. In Mr. Dillon Croker's pamphlet on "Cotswold Customs" he mentions a sermon delivered by a puritan clergyman of Stow, and published in 1736, where the passage occurs "What I have now been desiring you to consider as touching the evil and pernicious consequence of Whitsun Ales among us, doth obtain again against Dover's meeting . . .," and in 1819 horse-racing was added to the programme. This innovation seems to have initiated its ultimate degeneration (I

quote Mr. Edward Vyvyan) "into a trysting place of all the lowest scum of the population which lived between Birmingham and Oxford." These people came to Dover's Hill and remained there the whole of Whitsun week, creating all sorts of disturbances and demoralising the whole neighbourhood; so much so, indeed, that Mr. Boorne, of Wotton-under-Edge, determined if possible to get them stopped. He was successful, and a bill was passed through Parliament, and 1851 was the last year in which were witnessed the Olympic Games instituted by the "heroic Dover."

There is no doubt that the earlier writers of country books looked upon mankind as the proper study for man, and everything connected with rural life is dealt with in its human aspect. It was not till that "reporter of genius," Richard Jefferies, became what Henley calls "the Scandalous Chronicler of the warren and rookery, the newsmonger and intelligencer of creeping things and things that fly and things that run . . .," that ordinary prose-thinking people began to discover the wondrous charm of the country apart from its human relationship: a charm which increases in direct ratio to its remoteness and inaccessibility. Till within the last fifty years or so a passionate enjoyment of beautiful solitudes was considered the prerogative of poets alone: the ordinary mortal claiming a share in any such delights would have been deemed, to say the least of it, affected, if not ridiculous. And it has been left to such nature students as Seton or Bensusan to voice the joy that has been hitherto inarticulate, in the tameness of wild creatures in desolate places, that was so "shocking" to Alexander Selkirk.

It is not enough merely to observe: the interest, the enthusiasm, the sympathetic delight must be there also, and the increasing number of people who feel unfeigned joy in great spaces and large silences is assuredly one redeeming feature in our hurrying, bustling age. It is possible that the very fact that nearly everyone now looks upon such periodic rest as a necessity, explains how the majority get through the enormous amount of hard work that they do. And there is no question whatever that the "Country book" has done almost as much as the railway itself in popularising the country in spite of all Dr. Johnson and Charles Lamb can say to the contrary. Moreover it fulfils another and excellent function in bringing to one's mind the dear remembrance of past joys. And, to quote the ever delightful Elizabeth, "How wholesome to be reminded when days are rainy and things look blank of the many joyous hours one has had. Every instant of happiness is a priceless possession for ever."

O. S.

EXPERIMENTS ON PASTURE.

FIELD No. 13.

Experiments were continued on the 20 plots, each $\frac{1}{20}$ acre, used the last thirteen years or more (see *Agricultural Students' Gazette*, April, 1889, August, 1889 and 1890, December, 1891, August, 1892, 1893,

and 1894, July, 1895, August, 1896 to 1903, and December, 1904), the manures applied to each plot being the same in kind and in amount as in the previous years.

The manures and their amounts per acre were as follows :

NO. OF PLOT.		AMOUNT PER ACRE.	
A3.	Rape meal	5	cwt.
A2.	Thomas' basic slag	10	"
A1.	Farm-yard manure	12	tons.
1.	Sodium nitrate	2½	cwt.
2.	Kainite... ..	5	"
3.	Equalised Peruvian guano	5	"
4.	Superphosphate }	5	"
	Ammonium sulphate }	2	"
5.	Kainite }	5	"
	Superphosphate }	5	"
6.	Kainite }	5	"
	Superphosphate }	5	"
	Sodium nitrate }	2½	"
7.	Unmanured		
8.	Kainite }	5	"
	Superphosphate }	5	"
	Ammonium sulphate }	2	"
9.	Ammonium sulphate	2	"
10.	Kainite }	5	"
	Sodium nitrate }	2½	"
11.	Kainite }	5	"
	Ammonium sulphate }	2	"
12.	Equalised Peruvian guano	5	"
13.	Superphosphate	5	"
14.	Superphosphate }	5	"
	Sodium nitrate }	2½	"
B1.	Farm-yard manure	12	tons.
B2.	Thomas' basic slag	10	cwt.
B3.	Rape meal	5	"

This is the eighteenth year in succession for the application of the same manure to plots 1—14, the seventeenth year of the farm-yard manure plots, and the fourteenth year of the application of Thomas' basic slag and rape meal.

The farm-yard manure was applied on January 5, 1905 ; the basic slag and rape meal were applied on December 16, 1904 ; the superphosphate and kainite on February 28 ; the guano on March 4 ; the ammonium sulphate on April 7 ; and the sodium nitrate on April 14, 1905.

The guano, equalised Peruvian, contained combined nitrogen equivalent to ammonia, 7·5 per cent., phosphates 31 per cent., and potash 2·1 per cent.

The superphosphate contained 26 per cent. of "soluble" phosphate, and 2 per cent. of insoluble phosphate.

The kainite contained 12 per cent. of potash (K_2O).

The sodium nitrate contained 95.0 per cent. of pure nitrate, equivalent to 19.0 per cent. of ammonia, and the ammonium sulphate contained 24.6 per cent. of ammonia.

The basic slag contained phosphates equivalent to 38 per cent. of tricalcic phosphate.

The grass was cut on June 26th and weighed on July 4th; rain fell on June 29th and 30th and July 1st.

The yield of the plots, calculated to amounts per acre, was as follows:—

						Excess over Unmanured
						plot. cwts.
						Per acre, cwts.
A3.	Rape meal	...	...	...	14	—
A2.	Thomas' basic slag	...	...	...	$17\frac{1}{2}$	1
A1.	Farm-yard manure	...	...	...	$33\frac{5}{8}$	$17\frac{1}{8}$
1.	Sodium nitrate	...	...	...	$18\frac{5}{8}$	$2\frac{1}{8}$
2.	Kainite	...	...	...	$19\frac{1}{8}$	$2\frac{5}{8}$
3.	Guano	...	...	...	20	$3\frac{1}{2}$
4.	Superphosphate and ammonium sulphate	...	...	...	$32\frac{1}{2}$	16
5.	Kainite and superphosphate	...	...	...	$29\frac{1}{4}$	$12\frac{3}{4}$
6.	Kainite, superphosphate, and sodium nitrate	...	...	...	$41\frac{1}{2}$	25
7.	Unmanured	...	...	...	$16\frac{1}{2}$	—
8.	Kainite, superphosphate, and ammonium sulphate	...	...	...	$40\frac{1}{2}$	24
9.	Ammonium sulphate	...	...	...	$27\frac{1}{8}$	$10\frac{5}{8}$
10.	Kainite and sodium nitrate	...	...	...	$34\frac{1}{4}$	18
11.	Kainite and ammonium sulphate	...	...	...	$37\frac{3}{4}$	$21\frac{1}{4}$
12.	Guano	...	...	...	$24\frac{3}{8}$	$7\frac{7}{8}$
13.	Superphosphate	...	...	...	$19\frac{5}{8}$	$3\frac{1}{8}$
14.	Superphosphate and sodium nitrate	...	...	...	$33\frac{3}{4}$	$17\frac{1}{4}$
B1.	Farm-yard manure	...	...	...	$33\frac{1}{8}$	$16\frac{5}{8}$
B2.	Thomas' basic slag	...	...	...	$18\frac{3}{8}$	$2\frac{1}{8}$
B3.	Rape meal	...	...	...	$14\frac{3}{4}$	—

Some of the meteorological observations during the first half of the year are given below:—

	Rain. Inches.	Rainy days.	Average Rainfall, 36 years.	Mean temp. F°.	Days of frost on grass.
January ...	.84	13	2.53	39°2	25
February ...	.70	10	2.18	40°7	17
March ...	4.10	21	1.98	43°9	13
April ...	2.65	21	1.89	44°5	11
May ...	.29	7	2.05	49°7	6
June to 26th	2.62	16		58°1	
	11.20	88			

The rainfall after cutting the grass until the hay was carried was, June 29th, .44 ; 30th, 1.22 ; July 1st, .01 inches.

This year the plots receiving rape cake gave a smaller yield of hay than the unmanured ; the reason of this is not obvious, though it was clear that there was a smaller growth of top grasses on the rape cake plots. Kainite alone gave rather more hay than the unmanured, which is not always the case, and the crop had less leguminous plants in it than usual. All the other single manures, *i.e.*, ammonium sulphate, sodium nitrate, superphosphate, basic slag, guano, and farm-yard manure, gave less yields than last year, and less than the average. Superphosphate with ammonium salts, and superphosphate with nitrate of soda also gave less hay than last year and less than the average. But kainite with nitrate of soda and kainite with ammonium sulphate both gave crops above last year and above the average.

Cinereals alone, *i.e.*, superphosphate and kainite, gave a yield above the average, an increase of $12\frac{3}{4}$ cwt. above the unmanured, and it was even more leguminous than usual. Cinereals with nitrate and cinereals with ammonium sulphate were also both above the average and above last year's yield.

This year kainite in the mixtures seems to have had a very beneficial effect. The plots receiving phosphates showed a greater growth of clover than usual. The crop from the guano plots was of very good quality, and generally those receiving ammonium sulphate gave better quality than the corresponding ones with nitrate of soda.

The highest yield was given by mixed cinereals (superphosphate and kainite) with sodium nitrate ; then mixed cinereals and ammonium sulphate, followed by kainite and ammonium sulphate and kainite and sodium nitrate ; all these, and also the superphosphate and sodium nitrate together, and the farm-yard manure gave double or more than double the yield of hay of the unmanured.

The average yield per acre of all the plots was $26\frac{1}{4}$ cwt.

After hay harvest the whole field was grazed with cows and sheep.

E. K.

NORFOLK AGRICULTURAL TENANT RIGHT.

Having been asked to contribute something to the *R.A.C. Gazette*, it has occurred to me that a few words on the above subject may be of interest to many of the students and of use to some few.

As is well known, Norfolk is one of the best agricultural counties in England, and as far as gross produce per acre goes, I should imagine about the greatest producer. By far the largest proportion of the land being farmed on the well known four-course shift—wheat, roots, barley, seeds—of late it has become common to substitute some oats for wheat, but if so wheat is generally left out and the four-course adhered to. On the heavy lands beans may be substituted for seeds, but whether oats or beans are substituted it will be noticed that with only one year's lay it is a most exacting rotation and the farming must be good.

Taking the county through, the amount of cake used in the winter feeding of cattle and sheep is enormous. The rest of the county not farmed as above is either heath land or what we call "marsh," the "marsh" being artificially drained land adjoining the rivers and near the sea, in the Eastern parts of the county these drained "marshes" are all in grass, many "levels," as they are called, being good enough to fat a bullock of fifty to sixty stone of fourteen lbs. to the acre. The "marshes" are generally held by the landlords, who pay the rates, taxes, and clean out the drains, letting them by the season only to upland farmers. There is, therefore, practically no tenant right on either the marshlands or the heathlands, and what I have to say must be understood to refer to the upland farms first mentioned.

The universal term in Norfolk for the tenant right valuation is "Covenants"; no one ever calls the valuation by any other term than Valuation of the Covenants.

The valuation of these covenants is quite an important matter in the county, and is chiefly done by the various auctioneers. All farm changes are made on October 11th, Old Michaelmas Day. This is rather unfortunate, as the 29th of September would be better, and give more time to get in the mangel crop before the frosts come, but it would be hopeless to try to make a change amongst such a conservative body of men.

Some little time, then, before October 11th the outgoing tenant and the incoming tenant each appoint a valuer to value the covenants, and these two valuers appoint an umpire, who is called in if they cannot agree to fix the price, but as a matter of fact the first two generally come to terms.

The outgoing tenant's covenants consist of the hay and the roots grown the last year of the tenancy, the muck on the farm unused at the time of making the valuation, the bill for the small seeds sown the previous spring, and a few fixtures in the house.

Perhaps I cannot do better than give an actual copy of an award. This award was made in 1895 on a three hundred and eighty acre farm, and is in the usual form:—

[COPY.]

VALUATION OF COVENANTS, &c.,

Stamp, £1. upon the X X Hall Farm, X X, Norfolk, made
£935 18s. 0d. from Mr. A. B. to Mr. D. C.
1895.

Five stacks of hay.

The beet, swedes, and white turnips.

The seeds and sowing of new layers.

All the manure upon the farm.

Fixtures in house: then follows a list of stoves and a few other things.

Outside: two hay racks in riding stable.

Off premises: four swing mangers and chains.

Home premises : seventeen swing mangers and chains, one small ditto.

Implements, &c. : railed turnip cart, tumbril on cross arms, wagon, garden cutter, corn bin, three-and-a-half tons of steam coal, chaff cutter and horse works, six bullock feeding bins, one ditto, two corn bins.

We, the undersigned, having viewed and carefully examined the above described property, do hereby estimate the value thereof to be nine hundred and thirty-five pounds and eighteen shillings.

Witness our hands.

Charges for valuing £31 10 0

Stamps 1 0 0

2) 32 10 0

Each party ... £16 5 0

..... X
..... Y

The items after "Implements" were taken by mutual arrangement, and it is only the ones above that which are necessarily taken, the maximum prices having been fixed at a valuers' meeting each season before the valuations begin. The maximum usually ranges around 65s. for upland hay, 50s. for meadow per ton. Beet, £6 10s. ; swedes, £5 5s. ; white turnips, £3 10s. per acre. The muck, on quality, from 2s. 6d. to 4s. per two-horse cart load. The incoming tenant has to pay also for the thrashing and dressing and carrying out of the corn to a distance not exceeding eight to ten miles, but for this he is given all the straw.

It will be observed that the incomer only pays for what actually exists. If the outgoer has partially failed to get a crop of hay or roots, the incomer only pays for what there is ; not for work done. We seldom hear of the Agricultural Holdings Act in these parts. Under most agreements some small sum is awarded for dilapidations and bad farming, but it is usually a very small one, and hardly worth taking into account.

After twenty-five years' experience of estate management and farming in Norfolk, I am bound to admit that the Norfolk custom is, I consider, an admirable one, and well suited to the county, and on the whole very fair as between man and man ; and, what is more, I believe it to be popular, and that the great majority are convinced that it is a sound and good custom, and suited to the requirements of the county.

M. F., M.R.A.C., F.S.I., &c.

ROYAL AGRICULTURAL SOCIETY'S SHOW.

This Show was held at Park Royal, Willesden, on June 27th to 30th. Two free days were given to allow students and staff to visit the show, which all who availed themselves of this opportunity agreed

was quite a first-class show, and admirably managed. Unfortunately it failed to draw the public, and no doubt proved an almost fatal blow to the finances of the Society.

One of the most satisfactory features of this show was the distinct advance noticeable in the section devoted to Agricultural Education and Forestry, in which the Royal Agricultural College, as befitting the premier agricultural educational institution in the country, which numbers the popular and distinguished honorary director of the show, Sir Jacob Wilson, among its diploma members, took an honourable part. The stewards were Lord Moreton, a member of the Governing Body of the College, and Mr. J. Bowen Jones, M.R.A.C. The College exhibit was representative both of general scientific agricultural education and forestry, the R.A.C. being the only agricultural institution to contribute to the exhibition of forestry both this year and last. In the department of agricultural chemistry, the chief and most interesting exhibit from the R.A.C. was a large diagram showing the results of the manurial experiments on grass lands, carried on at the College by the Professor of Chemistry for the last fifteen years, and the lessons suggested by the tables were practically enforced by the exhibition of boxes containing squares of turf cut from some of the more interesting plots, and showing the character of the grasses produced by the various manurial dressings. There was also a comprehensive series of analyses of foods, arranged in labelled bottles showing the component parts.

In matters geological, there was a case containing a section of soil from the Oolite rock such as Cotswold farmers have to deal with.

The natural history department was of considerable extent and interest, including framed illustrations of various plant diseases, photographs of ticks and lice, framed drawings of insects injurious to crops, timber, etc., and spirit specimens of various animals and plants.

In the veterinary section were to be found a case of various kinds of horseshoes made at the College, a collection made at the College showing the dentition of horses and cattle, and pathological specimens of importance to owners and breeders of live stock.

Under the heading of forestry and estate management were specimens of British and foreign woods from the Forestry Museum, photographs illustrating well-known German woods of Scotch pine, Norway spruce, beech and oak; specimens of willow for cricket bats; bottles of wood pulp in process of manufacture; framed plan of Oakley Woods, Cirencester, available, by Earl Bathurst's consent, for instructional purposes for students of the College; working plan map of a German forest; measuring and forest instruments; and plans of loose boxes suitable for a stud farm, of two semi-detached cottages, and of shippon.

There were many miscellaneous items, comprising specimens of British, Colonial and Argentine wools, including Australian wool, showing the "Bathurst Burr," a plan of the College farm drawn to a 25 inch scale, photographs of the College, the Chapel, the Botanical Garden, &c. Altogether the stand was one of interest and variety.

ROYAL AGRICULTURAL COLLEGE DAIRY RECORD.

For the Six Years, January, 1899, to December, 1904.

BREED.	Number of Cows during the six years.	Average Weight per Cow.	Total No. of days in Milk.	Total Milk in lbs.	Daily Average in lbs. per Cow.	Average Percentage of Cream per Cow.	Average Percentage of Butter-fat per Cow.
Shorthorn ...	21 Cows	cwt. qrs. lbs. 11 2 0	5,701	132,105	23·17	* 10·2	* 3·51
Ayrshire ...	11 Cows	9 2 14	2,871	75,992	26·46	8·8	3·33
Red Poll ...	9 Cows	9 3 0	1,982	42,150	21·26	9·0	3·48
Jersey ...	8 Cows	8 2 0	2,244	43,128	19·20	16·3	4·64
Guernsey ...	7 Cows	8 1 0	1,779	26,126	14·68	18·9	5·33
Dexter Kerry ...	7 Cows	6 2 14	1,794	24,350	13·57	10·0	3·50

* NOTE.—The Percentages of Cream and Butter-fat Tests here noted are those taken from MORNING'S MILK ONLY.

ROYAL AGRICULTURAL COLLEGE CLUB.

The annual dinner of the Royal Agricultural College Club was held on Wednesday evening, June 28th, at the Trocadero Restaurant, Piccadilly, and was attended by upwards of thirty members and guests. The chair was taken by the president for the year, Mr. Bruce Swanwick, and those present were the Principal of the College (the Rev. J. B. McClellan, M.A.), Major Craigie, C.B. (assistant secretary to the Board of Agriculture), Mr. A. Goddard (secretary to the Surveyors' Institution), Messrs. Charles Bathurst, R. D. Cumberland-Jones, J. C. Medd, Captain R. W. Oldnall, Messrs. W. McCracken, H. J. Marshall, S. Bevan, A. L. Hillyar Cleland, F. H. Osmond-Smith, C. Annesley-Cooke, S. P. Davies, V. D. Stenhouse, Hon. B. Howell Jones, G. J. M. Burnett, J. E. de Grey Henniker-Major, Gilbert Symons, J. G. Turnbull, J. Ruffle, A. G. Foulkes, C. Pilkington, J. Herbert Taylor, T. L. Aveling, W. T. Hall, A. G. Scorer, C. H. Hooper, and E. B. Haygarth (hon. secretary and treasurer).

The royal toasts having been proposed from the chair and duly honoured,

Mr. Cumberland-Jones proposed the toast of the Royal Agricultural College and the College Club. He said to most of those present that toast represented the toast of their Alma Mater. He was, however, not in that happy position, but his father was a member of the College, so that the relation between the College and himself was, he supposed, that of grandmother, and he did not know that there was any law against proposing the toast of one's grandmother. (Laughter). At all events he possessed this qualification for proposing that toast; he was perhaps the nearest geographical neighbour of the College, because his small property joined the boundaries of the College Farm, and he thought he might say that they had always been most excellent neighbours. At any rate, speaking on his own behalf, he had always found the College a neighbour not only in the geographical but also in the Scriptural sense, for even on that occasion he had been most hospitably entertained. Although his knowledge of the College was necessarily confined to its external activities, and did not include an acquaintance with its internal studies, if he had trodden more closely in his father's footsteps he should no doubt have received an education which would have enabled him to put in practice the motto of the College, "*Arvorum cultus pecorumque*," instead of an education which merely enabled him to construe it. But though he was able to say nothing about the studious life of the College, he was convinced that the studious side existed, in proof of which he could call as witnesses, if necessary, many of the gentlemen present that evening. He need, in fact, go no further than their Chairman, for those of them who knew what Mr. Bruce Swanwick's career at the College had been, and what his career since he left the College, knew that the College was proud of that career, and he ventured to think that their Chairman was proud of and grateful to the College. He might also refer, as

evidence of the studious side of the life at the College, to what many of them had seen at Park Royal during the last day or two. For instance, he was told that the show of the Royal Agricultural Society included, in the forestry section, an extraordinary exhibit of timber from the forestry department of the Royal Agricultural College. He might also refer to the exhibition at the Park Royal Show of the results of the interesting and important experiments carried on for the last fifteen years at the College in the manuring of grass land, and over which he believed Professor Kinch had been the presiding spirit for a great many years. In the presence of so many real educational experts it would ill become him to attempt to discuss the important position of the Cirencester College in the educational system of the country. He believed, however, that all experts were agreed that specialism in education was every day more and more coming to the front as one of the crying needs of this country, and he thought he was right in saying that the Royal Agricultural College was the first example of special education as applied to agriculture. It was true that it had been imitated and its example followed by the establishment of similar institutions in other parts of the country, but the College welcomed that imitation as the greatest compliment that could possibly be paid to it. (Applause.)

The Principal, whose name was associated with the toast, said he felt it a very great honour to be called on to return thanks for the Royal Agricultural College and the College Club. At the same time he fully felt that the College was not in any way represented by one particular person. The College was a combination of Governing Body, Principal, Professors, and Students, past and present, and the success of the College must depend on their happy co-operation which he had always witnessed during the time he had had the honour of presiding over it. He could assure them that the Governing Body had during all those years been desirous to extend the advantages of the College. The Professors, too, had a great deal to do with the success of the College, and it was a great pleasure to him to know that during the whole time he had been Principal they had given him most earnest counsel and help in every way, and had devoted themselves to the best interests of the students under their charge. As regarded the students, he was sure they recognised that the success of the College was only possible through the happy co-operation of the students themselves, and he very gratefully tendered to those present, who represented the large body of men who had been at the College, his hearty thanks for the way in which they had always responded to the wishes of those who were for the time being not only their friends, but in authority over them. He was sure the authorities of the College were proud of having had such students as the Chairman, men who were taking part in the agriculture of the county, like Mr. Bathurst, and men who were doing good work in the agriculture of the country at large. Met as they were almost under the auspices of the show of the Royal Agricultural Society, it was a great satisfaction to them to know that

the director of the Royal show was an old student of the College, Sir Jacob Wilson—(applause)—and when they looked back at the work which Sir Jacob had done in the past, they felt satisfied that a great deal of the success of the Royal show in past years was due to one who received his agricultural training at the R.A.C., and who had always been good enough to acknowledge the benefits he there received in qualifying him for the high posts he had since held. With regard to the agricultural education exhibition at Park Royal, the R.A.C. was the only College which had supplied forestry exhibits both last year and this year. The results of the experiments on pasture were, too, of considerable value and importance. Professor Kinch's chemistry exhibits in connection with the analyses of foods were also of great value, while the veterinary exhibits, the collection of wools, the collection of timbers, and other matters testified to the value and variety of the College work.

Mr. H. J. Marshall proposed the toast of the Royal Agricultural Society, remarking on the changes which had of late taken place in its manner and method, changes which some of them had approved and some had disapproved, and expressing the hope that they should get back to a show purely and solely for the advantage of agriculture.

The Chairman proposed the toast of the Board of Agriculture, coupled with the name of Major Craigie. He said in many ways they were indebted to the Board of Agriculture for guidance, counsel, and assistance. The Board expended £9,000 a year in the promotion of agricultural education in various centres. It also disseminated agricultural knowledge of various kinds by means of leaflets and returns, while the information which it issued with regard to the prices of live stock and other matters was of very real use to practical farmers. (Hear, hear.) The part which the Board of Agriculture played in the agricultural industry of the country might not be very important as compared with what was done by the State for that industry in many other countries, but that was due to the fact that in England individual enterprise did far more than it did in some more backward countries. In the future, however, he thought they should have to depend far more than they had done on the support and assistance of the State, and they hoped that public opinion would support the demand of agriculturists that a much larger sum of money should be allocated to the Board of Agriculture for the prosecution and the extension of its various very useful activities. In conclusion he referred to the valuable work which the Board of Agriculture did in the protection of the live stock of the country from disease, and said that the manner in which the Board had refused to yield to the criticisms of various interested persons had earned the gratitude of the agriculturists of the whole country.

Major Craigie, in returning thanks, said his part in connection with the Board of Agriculture had been co-extensive with the existence of the Board itself, and in accepting the Chairman's kind observations he confessed it was a certain gratification to those who had worked from

the initiation and organisation of the Department that their efforts should be recognised by a meeting like that of the Royal Agricultural College Club, representing a College which was the premier institution that had promoted and aided the study of scientific agricultural education, while he could not help remembering the prominent part taken in every department of British agriculture by men who served their time at that College and had done good work there. The duties of the Board of Agriculture were both new and old, and they were always extending, though he regretted to say that the means placed at their disposal did not extend in the same ratio, but he could claim that the aim of the Board and its officials was to endeavour to serve to the utmost the agricultural interest of the country, and to promote as far as was in their power the best interests of all those connected with the cultivation of the soil. He congratulated the College on the important part it had taken in promoting the great advance noticeable in the agricultural education exhibition at the Royal Show, and assured them that the Board of Agriculture would gladly welcome any suggestions from the Royal Agricultural College for the furtherance of its work.

Mr. Charles Bathurst proposed the toast of the Surveyors' Institution, coupled with the name of its secretary, Mr. Goddard, a distinguished old student of the R.A.C., remarking that the membership of the Institution included the names of most of the College's ablest students.

Mr. Goddard said the interests of the R.A.C. and the Surveyors' Institution were closely allied, and anything he could do to strengthen the ties between the two it would be a labour of love to him to carry out. The Principal was one of their most honoured members, while, as had been said, many old students of the College were among their most distinguished members. He strongly advised gentlemen who passed through the College course to also take up the examination of the Surveyors' Institution, and anything he could do to assist candidates from the College he should very gratefully do.

Mr. Stenhouse, in a humorous speech, proposed the toast of the visitors, and

Mr. J. C. Medd, who was called on to respond, said there were two small points which he had for some time desired an opportunity such as that of mentioning. The first had reference to the conference on agricultural education which they held at Gloucester last October. One of the most striking features of that conference was a map which Lord Onslow had prepared and displayed on the wall as he spoke, and which was intended to illustrate the various counties in England where agricultural education was given. In that map Gloucestershire appeared as one of three counties that were blank, and Lord Onslow entirely ignored the very College with which they were associated, and which was the oldest agricultural college in England. And why? Because unfortunately the Board of Agriculture had no official knowledge of their existence. That fact illustrated the chaotic condition in which the whole of that branch of our education to-day was. A foreigner coming to England and inquiring of the Board of

Agriculture as to the facilities for agricultural education, would go away without ever having heard the name of the first agricultural college in England, unless he heard it by accident. Lord Onslow rightly reflected upon those counties which appeared to be blank as far as agricultural education was concerned, but whose fault was it? Major Craigie would pardon him for saying that the fault lay with the Board of Agriculture. Mr. Swanwick had referred to the assistance which the Board of Agriculture gave to agricultural education. But how was the money disposed of? It was practically confined to some half-dozen counties, the greater part going to the Home Counties. The Board of Agriculture, it was true, had no more money to give, but if the Board did not co-operate with their local authorities in establishing facilities for agricultural education, the Board had no right to throw it in their teeth that they were not provided with facilities. He asked those present to urge that question forward in their own localities. He believed from what had happened in Denmark and Holland, that education that was practical and well thought out was a direct benefit to agriculture, but it must have proportionate State assistance, and that State assistance would never be forthcoming till those identified with agriculture insisted upon having it, and the line they should take was that the Board of Agriculture should either have no money to distribute for that purpose, or it should have enough money to treat every county upon terms of exact equality. His other point referred to agricultural labour, which in their part of England was scarce, and bad in quality. What they wanted was labour possessed of greater intelligence and more practical knowledge, and he did not see how they should get it unless they gave up having innumerable tiny schools in their villages, and had instead consolidated schools as they had in Canada and United States. In conclusion, he proposed the health of the Chairman, congratulating him on the fact that the happiest event of his life, which was to take place next month, occurred in the year of his presidency of that Club, and that they were able to welcome the presence of the Chairman's future father-in-law. (Cheers.)

Mr. Bruce Swanwick suitably acknowledged the compliment, and proposed the health of the excellent Secretary, to whom the success of their Club and of those enjoyable gatherings was mainly due.

Mr. Haygarth returned thanks, and after a few genial reminiscent words from Mr. Aveling, recalling the benefits which he as an engineer derived from his studies at Cirencester, the proceedings terminated.

EXCURSION TO ROTHAMSTED.

On Friday, June 17th, by kind permission of the Trustees of the Lawes Agricultural Trust, a visit was made to the experimental farm at Rothamsted. The party arrived at Harpenden at 10.15 a.m., and immediately proceeded to the experiment station under the guidance

of Professor Kinch, who had previously given a special lecture on Rothamsted to the students visiting the station.

The granite monument, erected in 1893 to commemorate the fiftieth year of the experiments, having been admired, a short inspection was made of the Sample house, which contains among other interesting things an enormous number of samples of soil taken, for future reference and analysis, from the various experimental plots at different times, and also a case shewing the complete botanical analysis of the herbage of some of the grass plots.

About seven acres of grass land in Rothamsted Park are laid out in 20 strips, which have since 1856 been systematically treated with the different constituents of a complete manure in various quantities and combinations.

Thither the party proceeded and were met by Mr. A. D. Hall, the director of the experiments, who explained very clearly the system pursued and drew attention to the chief characteristics of the herbage produced by the various dressings.

These grass experiments are particularly instructive because the same manuring has been continued for so long on the same plots—the crop being cut twice a year and entirely removed as hay—that the factor of the soil's chemical constitution has been almost eliminated; and perhaps of all the experiments those showing the effects of the exhaustion of one or more of the constituents of a complete manure are the most interesting.

The results of "potash starvation," in particular, are very noticeable—a characteristic weakness of the stems of the grasses, which are of an unhealthy dark green colour, and a marked deficiency of leguminous plants.

Mr. Hall mentioned that on these plots the grasses are peculiarly liable to fungoid diseases, and the same is the case with the mangels on the plot from which potash is continuously withheld, while, *per contra*, a liberal supply of potash on one of the wheat plots has had a marked effect in diminishing "rust."

The extent to which an abundant supply of mineral manures alone can, by encouraging the leguminous plants, keep up the fertility of land even under the most exhaustive cropping is illustrated by three plots, on which clovers and vetchlings are very conspicuous and which have given for the last 30 years an average, in two cuttings, of over two tons of hay per acre, as against 22 cwt. on the continuously unmanured plot.

In 1904 the produce of these three plots averaged 67 cwt., and was exceeded to the extent of 6 cwt. only by that of the plots which received the equivalent of 400 lbs. of ammonium-salts in addition. Moreover it appears that the effect of even a small quantity of nitrogenous manure is to reduce, and of a large quantity to almost exterminate the leguminosæ, and when the superiority in quality of herbage containing a large proportion of such plants is considered, the question suggests itself whether, even where the aftergrass is not, as it

generally is, grazed, a dressing of nitrogenous artificial manure is profitable.

Many of the plots show the effect of exhaustion of lime, the manurial value of which is perhaps sometimes overlooked, and on one plot an excess of ammonium salts has made the surface, which is covered with a mass of rotting vegetation, positively acid.

This grass field must be seen for the results to be appreciated ; the character of the herbage changes abruptly from plot to plot, and no description can enable one to recognise the symptoms of an excess or deficiency of different manurial constituents here displayed, but anyone interested in the subject should read Mr. Hall's exhaustive article in the *Journal of the R.A.S.E.* for 1903.

The Broadbalk and Hoos fields, devoted to the continuous growth of wheat and barley, were next visited. The weight and quality of the grain is the only criterion by which the results of these cereal experiments can be gauged, the appearance varying with the amount of nitrogen supplied. Owing to the lateness of the season the effect of phosphates in the direction of early maturity was not yet visible.

The drainage water from the wheat plots in the Broadbalk field is collected and analysed, and valuable results as to the loss of manures by drainage have been obtained.

Part of the Hoos field is under leguminous crops, experiments bearing on the "inoculation" of the soil for such crops and on "clover-sickness" being in progress. A noteworthy fact, and one that is very apparent, is that the growth of a leguminous crop till the land is "sick" affects the growth of a subsequent crop of a nearly allied species more than that of a more remote one.

The party returned to the sample house, where a most refreshing luncheon was provided ; after which they again set out and visited the Agdell field, worked under two similar four-course rotations, one of which includes a clover or bean crop, as against a bare fallow in the other. The effect of the nitrogenous residues of the clover crop of three years ago in increasing the growth of the barley this year was quite visible. Mr. Hall said the bean crops were not so effectual.

The last field visited was that in which mangels have been successfully grown for 30 consecutive years. The plants were just showing in the drills. In one corner of the field are the rain and drain gauges, and an ingenious arrangement for recording the varying relation of the soil temperature to that of the air.

Altogether the visit left on one's mind the impression that here no phenomenon, however obscure, likely to influence the growth of crops, is left unobserved. The wealth of accumulated experience which enables the results to be consistently explained can only be equalled by the courtesy and lucidity with which the explanations are given.

To the Trustees, and especially to Mr. Hall, who devoted to the visitors the greater part of the day, their best thanks are due for an experience likely to be as useful as it certainly was enjoyable.

OBITUARY.

We deeply regret to record the death of Sir Jacob Wilson, M.R.A.C., which took place at Chillingham Barns, Northumberland, from heart failure on July 11th, after three or four days illness. Mr. Wilson took his diploma in 1855 when nineteen years of age, and remained on at the College for six months as honorary farm bailiff and curator of the Veterinary Department under Prof. G. T. Brown. In 1858 he obtained the first agricultural diploma awarded by the Highland and Agricultural Society of Scotland, becoming F.H.A.S., by examination. He devoted a good deal of attention to agricultural machinery, and as early as 1857 the harvest on his father's farm was cut by a self-delivery machine, and in the following year he obtained the first prize in a great trial of reaping machines in Northumberland; he was also one of the first to use steam cultivation.

In 1865 he was elected on the Council of the Royal Agricultural Society and often filled the office of steward of live-stock; from 1875 to 1892 he was Honorary Director of the R.A.S.E. Shows, an onerous post which he filled with great credit to himself and advantage to the Society.

Mr. Wilson was a Juror at the Paris Exhibition in 1878.

He was a member of the Royal Commission on Agriculture in 1881. In 1889 he was made a Knight Bachelor in connection with the Jubilee Show of the R.A.S.E. at Windsor, and only a fortnight before his death the honour of Knight Commander of the Victorian Order was conferred upon him by the King.

He took a very active interest in the exclusion from the country of imported animal diseases, and when the Board of Agriculture was established and Mr. Chaplin was made the first President, Sir Jacob became Director of the Land Branch and Agricultural Adviser to the Board.

Sir Jacob was tenant of Woodhorn Manor Farm, near Morpeth, and Agent for several large Northumberland estates, and for many years was responsible for the education of a large number of pupils both in farming and estate management.

Twice in his life Sir Jacob received tangible evidence of the appreciation of the agricultural world of the great services he rendered to it during his full and very active life. In 1884 he was presented on behalf of a large number of subscribers with a cheque for 3,000 guineas, and in 1892 the Royal Agricultural Society presented to him plate and a life governorship of the Society. On the first occasion the presentation was made by the Duke of Richmond, who spoke warmly of the great assistance Sir Jacob had rendered in connection with the last outbreak of cattle plague in this country. On the latter occasion, on the retirement of Sir Jacob from the Directorship of the Shows of the Society, the Duke of Richmond, in making the presentation, remarked—"His courtesy and urbanity, under all circumstances, were familiar to all, and his good humour had never

been known to fail. Whether under the burning sun of the Windsor meeting, or among the swamps of the disastrous show at Kilburn—where they walked about the show-yard on planks—Sir Jacob Wilson never once lost his temper or relaxed his exertions.”

Sir Jacob was a Corresponding Member of the Board of Studies of this College, and always ready to acknowledge the benefits he had received from it and ready to help in extending those benefits to a younger generation. He contributed a paper on the “Progress of Agricultural Education” to this *Gazette* in the Jubilee number, July, 1895, which finishes with the words—“It is not enough for the agriculturist of to-day to have a willing arm or an energetic brain (though without them success is impossible) unless his arm be strengthened and his brain developed by education.”

At the unanimous desire of his colleagues on the Council, Sir Jacob undertook his old duties of Honorary Director of the Royal Agricultural Society’s Show this year, and threw into the work all the energy and enthusiasm which was characteristic of his former holding of the office. For two or three years past Sir Jacob had suffered in health, and we fear that his late exertions tended to shorten a life which has been full of usefulness to the Agriculture of England. His age was 68. All old students and all readers will join in deep regrets.

FARM NOTES.

At the sale at Newmarket, on July 6th, Mr. Russell Swanwick sold a chestnut colt by Cyllene—Sweet Balsam for 810 guineas, also a bay colt by Sainfoin—Lady Raeburn for 260 guineas. On a previous day Mr. Bruce Swanwick sold Double Halo, m., by St. Florian—St. Agnew, with colt foal by Grey Leg, for 350 gs.

The College flock has been renewed by the purchase of two Suffolk ewe lambs from Colonel Baird, Exning House, Newmarket; two Dorset ewe lambs from Mr. J. Chick, Compton Valence, Dorchester; and two Border-Leicester ewe lambs from Messrs. Faulder, Oakbank Longtown, Cumberland. The flock is now well represented by ten different breeds.

CHLORINE IN RAIN WATER.

During the six months ending March 31st last the rainfall was 10·22 inches, of which 4·1 inches fell in March: the rainy days in the half-year were 89, and the rain contained on an average chlorides equivalent to 451 grains of sodium chloride per gallon, making a deposit of 14·83 lbs. of common salt per acre. For the twelve months ending the same date the rainfall was 24·89 inches on 172 days, and contained chlorides equal to 27·21 lbs. per acre.

E. K.

SURVEYORS' INSTITUTION.

Mr. H. S. Mathews, M.R.A.C., Mr. H. G. Browne, M.R.A.C., and Mr. D. H. Leech, M.R.A.C., have passed the examination for the Professional Associateship. Mr. Cuthbert E. A. Ermen, M.R.A.C., has passed the examination for Fellowship.

Mr. Mathews obtained the Beadel Prize.

Mr. Alexander Goddard, M.R.A.C., has taken up his duties as Secretary on the retirement of Mr. J. C. Rogers at the end of May last.

DIPLOMA EXAMINATION.

At the last term's examination in April Mr. Cyril Annesley-Cooke obtained the Diploma of Membership. The external examiners were Mr. J. J. Harle, M.R.A.C., in Agriculture; Dr. J. A. Voelcker, F.I.C., in Agricultural Chemistry; and Prof. H. Robinson, M.I.C.E., in Land Surveying and Engineering.

SCHOLARSHIPS.

The First Scholarship last term was gained by Albert Sasson, the Second and Third were divided between M. P. Knubley and L. B. Akers.

OLD STUDENTS.

The King has approved the appointment of Mr. John William Pitt Muir-Mackenzie, Indian Civil Service, M.R.A.C. (1887), to be an Ordinary Member of the Council of the Governor of Bombay.

J. Bowen-Jones, Esq., M.R.A.C. (1860), Vice-President of the Royal Agricultural Society of England and Chairman of the Shropshire County Council, succeeds Sir Jacob Wilson as Corresponding Member of the College.

CORRESPONDENCE.

To the Editor of the Agricultural Students' Gazette.

July 6th, 1905.

Dear Sir,—May I be allowed through the medium of your columns to advise all R.A.C. students who are studying for the land agency profession to make a point of qualifying by examination for the Membership of the Surveyors' Institution. A large amount of the work required for these examinations is covered by a course of instruction at the College, whilst the knowledge gained of the additional subjects in these examinations is of great value in general practice. In addition to the benefits derived from an educational standpoint, membership of this Institution is a valuable qualification when applying for an agency or for a Government post. A register of Members requiring employment is kept at the Institution, and is an excellent medium for obtaining work. In case where students are under 21 years of age they can by passing a simple preliminary examination, held annually in January, qualify for the P.A.S.I. with a lower percentage of marks than they could had they not passed it.

Yours faithfully,

The Estate Office, Midhurst.

F. H. OSMOND-SMITH.

CRICKET.

CHARACTERS OF THE XI.

- E. HOPTON—Has captained the team well, but has had bad luck in not winning more matches. Bowled well against Old Students, and a very useful bowler when once he has found his length.
- G. LYON—Improved on last year in bowling and batting, especially in bowling.
- K. MCDIARMID—Very useful bowler with nice break.
- J. POORE—Has shown a great improvement in his batting, is a good field, has taken some wickets.
- H. S. VERNON—Of great use as a fast bowler, but has had very bad luck in the number of wickets he has taken.
- E. LONGCROFT—One of our best bats, with an excellent off drive.
- W. OSBORN—Has made great improvement in his batting during the session, is a hard hitter, has kept wicket with success.
- H. T. BULLOCK—A very pretty bat, must learn to keep the ball down in the slips.
- H. BEARDSLEY—Very smart field, has kept wicket.
- H. DE B. ARCHER—Bats in nice style, could do better with practice.
- C. KEARTON—Can keep up his wicket, but must learn to stand up to the wicket and keep a straight bat, fields well.

R.A.C. v. SWINDON.—Played at the College on Saturday, May 27. Score :

SWINDON.		R.A.C.	
G. W. Mathews, b K. McDiarmid	60	G. Lyon, c G. Mathews, b Warner	20
R. Reynolds, c Bullock, b Hopton	2	C. Kearton, b Warman	20
Harling, b Lyon	11	H. Bullock, c H. Mathews, b Davies	27
S. Warner, b K. McDiarmid	84	K. McDiarmid, b Warner	3
W. R. Osborne, b Hopton	31	W. Osborn, c H. Mathews, b Davies	5
H. Davies, c and b Hinds	18	H. Vernon, l-b-w, b Davies	8
J. Tinsley, run out	1	E. Hopton, b Davies	6
E. Beardshaw, c Pearson, b M'Diarmid	0	H. Beardsley, c G. Mathews, b Davies	0
H. Mathews, run out	2	F. Taylor, c Harling, b Davies	3
H. Warman, b McDiarmid	4	J. McDiarmid, b Davies	0
S. Davis, not out	0	T. Hinds, not out	4
Extras	13	Extras	2
Total	226	Total	98

R.A.C. v. ST. PAUL'S COLLEGE, CHELTENHAM.—Played on the R.A.C. ground on Wednesday, May 31. Score :—

R.A.C.		ST. PAUL'S COLLEGE.	
G. Lyon, c and b Fretwell	3	J. W. Cook, b Lyon	25
C. Kearton, b Fretwell	0	J. G. Maggs, b Hopton	13
W. Osborn, b Fletcher	3	E. Evans, c Beardsley, b Hopton	8
H. Bullock, c Richens, b Fletcher	9	P. Wilson, c Lyon, b Hopton	1
E. Longcroft, b Fretwell	9	W. Richens, b Hopton	20
J. Poore, b Fretwell	0	E. North, c Osborn, b Vernon	9
H. Vernon, c and b Fretwell	54	V. Wingham, not out	26
E. Hopton, b Cook	14	F. Waring, c Kearton, b Poore	30
H. B. Archer, not out	9	A. J. Galsthorpe, c Hinds, b Poore	3
H. Beardsley, run out	5	W. Fretwell, run out	14
T. Hinds, b Fretwell	0	W. Fletcher, b Longcroft	5
Extras	13	Extras	30
Total	119	Total	184

R.A.C. v. STROUD.—Played at Stroud on Saturday, June 3. Score:—

R.A.C.		STROUD.	
G. Lyon, b Poole ...	3	W. Croome, c Joynson, b McDiarmid	67
C. Kearton, b Merrett ...	2	D. Fergusson, c Hopton, b Lyon ...	30
H. Vernon, b Poole ...	6	H. L. Crewe, 1-b-w, b McDiarmid	21
H. Taylor, c Chapman, b Merrett...	1	C. Merrett, b Lyon ...	30
Ryland, b Merrett ...	10	H. W. Holloway, c Lyon, b Poore	59
A. Cooke, run out ...	1	W. Smith, c Lyon, b Cooke ...	22
E. Hopton, c Holloway, b Poole ...	2	J. L. Watt, b Lyon ..	1
K. McDiarmid, c Lawson, b Merrett	1	V. Lawson, b Cooke ...	42
J. Poore, b Merrett...	12	H. Poole, b Lyon ...	18
H. Beardsley, b Merrett ...	3	W. J. Gallop, not out ..	34
C. Joynson, not out...	3	A. Chapman, b Lyon ...	2
Extras ...	0	Extras ...	9
Total ...	44	Total ...	335

R.A.C. v. CHELTENHAM.—This match was played at Cheltenham on Saturday, June 10. Score:—

R.A.C.		CHELTENHAM.	
T. Pryce, c Harris, b Woof ..	0	C. S. Barnett, b McDiarmid ...	22
G. Lyon, b Harris ...	0	V. Barnett, c Osborn, b McDiarmid	32
W. Osborn, c James, b Harris ...	13	Prewer, 1-b-w, b McDiarmid ...	16
E. Longcroft, b Harris ...	2	B. Shurmer, c and b Lyon ...	35
Ryland, c Norman, b Woof ...	2	F. Norman, b Lyon ..	2
H. Vernon, b Woof ...	0	J. O. T. Powell, c B'rdsley, b Vernon	41
H. Archer, c Barnett, b Woof ...	5	A. D. Fenning, b Lyon ...	0
P. Pero, b Harris ...	2	C. H. Margrett, c Archer, b Vernon	25
J. Poore, not out ...	4	W. C. Woof, c Beardsley, b Vernon	4
K. McDiarmid, b Woof ...	0	W. James, run out ...	2
H. Beardsley, c C. Barnett, b Woof	4	F. H. Harris, not out ...	7
Extras ...	0	Extras ...	31
Total ..	32	Total ..	217

R.A.C. v. ST. PAUL'S COLLEGE.—Played at Cheltenham on Saturday, June 24th. Score:—

R.A.C.		ST. PAUL'S COLLEGE.	
J. Poore, c Beynon, b Fretwell ...	0	J. W. P. Cook, b Vernon ...	8
W. Osborn, c Beynon, b Fletcher...	16	J. Maggs, b Lyon ...	1
T. Bullock, c Rhys, b Fletcher ...	5	E. B. Beynon, b Lyon ...	4
K. McDiarmid, b Fretwell ...	0	W. Fletcher, b Lyon ...	0
E. Longcroft, b Fletcher ...	31	W. Fretwell, b Lyon ...	1
E. Hopton, c Maggs, b Fletcher ...	2	W. Richens, c Poore, b Vernon ...	2
G. Lyon, b Fletcher...	4	P. T. Wilson, b Lyon ...	8
H. Vernon, b Fletcher ...	19	A. H. Galsthorpe, c Osborn, b Lyon	10
J. Taylor, c and b Fretwell ...	1	V. Wingham, run out ...	0
H. Beardsley, not out ...	2	C. Rhys, b Vernon ...	3
J. Popple, c Rhys, b Fletcher ...	0	F. Waring, not out ...	5
Extras ...	7	Extras ...	6
Total ...	87	Total ..	48

R.A.C. v. CHELTENHAM.—Played on the College ground on Wednesday, July 5th. Score:—

R.A.C.		CHELTENHAM.	
H. Bullock, c Shurmer, b Mills ...	7	H. Wilkins, b Lyon...	12
E. Hopton, b Mills ...	0	H. Elmes, c Osborn, b Vernon ...	2

G. Lyon, c Brown, b Mills	23	Mills, b Lyon	11
E. Longcroft, b Mills	0	B. Shurmer, b Lyon... ..	6
W. Osborn, b Mills	17	P. Bach, l-b-w, b Hopton	23
H. Vernon, b Mills	0	J. O. T. Powell, c Lyon, b Longcroft	30
J. Poore, b Mills	7	C. Margrett, not out	30
K. McDiarmid, c Bach, b Mills	9	Prewer, c Beardsley, b McDiarmid	12
H. B. Archer, c sub., b Prewer	2	H. Brown, b Lyon	6
C. Kearton, not out... ..	1	S. Bath, b Lyon	0
H. Beardsley, b Prewer	0	W. Sawyer, b Lyon	0
Extras	8	Extras	10
Total	74	Total	142

R.A.C. v. SWINDON.—Played at Swindon on Saturday, July 8th. Score:—

SWINDON.		R.A.C.	
H. Mathews, b McDiarmid	13	T. Bullock, c Williams, b Warman	10
Harling, c Kearton, b Bullock	74	K. McDiarmid, b Warman... ..	1
H. Snell, c Poore, b Vernon	112	E. Longcroft, b Wainwright	30
H. Warman, c McDiarmid, b Vernon	10	C. Kearton, b Pugh	3
C. Williams, not out	16	H. Vernon, c Warner, b Pugh	0
G. Mathews,		W. Osborn, c Warner, b Warman	7
S. Warner,		H. B. Archer, b Pugh	1
J. Armstrong,		J. Poore, b Pugh	6
J. Pugh,		H. Taylor, b Pugh	0
E. Wainwright,		H. Beardsley, st B'dshaw, b W'wright	2
E. Beardsshaw,		E. Hopton, not out	0
Extras	8	Extras	3
Total (4 wickets)	233	Total	63

R.A.C. v. CIRENCESTER.—Played on the Town ground on Wednesday, July 12. Score:—

CIRENCESTER.		R.A.C.	
W. G. Tovey, c B'rdley, b M'Diarmid	55	J. Poore, b W. G. Tovey	5
T. H. Fowler, c Lyon, b Vernon	20	H. B. Archer, b W. G. Tovey	1
H. J. Tovey, c Osborn, b Vernon... ..	42	W. Osborn, b Jennings	34
E. Fawcett, b Vernon	9	K. McDiarmid, b W. G. Tovey	0
S. Boulton, b McDiarmid	99	E. Longcroft, c T. Fowler, b H. Tovey	32
H. L. Guyon, run out	16	G. Lyon, not out	13
Rev. A. W. Barker, c Osborn, b Lyon	24	H. Vernon, c Barker, b H. Tovey	3
J. Bedell-Sivright, l-b-w, b Longcroft	35	T. Hinds, b W. G. Tovey	2
Jennings, not out	5	C. Kearton, c T. Fowler, b Jennings	0
C. Fowler, b McDiarmid	1	E. Hopton, b W. G. Tovey	1
J. Spencer, b McDiarmid	15	H. Beardsley, b W. G. Tovey	0
Extras	14	Extras	8
Total	335	Total	99

R.A.C. v. STROUD.—Played on the College ground on Saturday, July 15th. Score:—

R.A.C.		STROUD.	
G. Lyon, b Holloway	35	W. Croome, l-b-w, b Lyon... ..	25
H. Beardsley, b Huggins	0	W. Smith, b Vernon	22
J. Poore, b Poole	10	H. Iles, c Osborn, b Vernon	0
E. Longcroft, b Huggins	2	G. Holloway, b Vernon	19
W. Osborn, b Huggins	3	T. Davies, b Lyon	11
T. Bullock, c Huggins, b Holloway	17	H. Crew, c Kearton, b Lyon	2
E. Hopton, c G. Holloway, b Poole	9	H. Holloway, b Lyon	2
K. McDiarmid, b Huggins... ..	10	V. Lawson, l-b-w, b Lyon	12

H. Vernon, b Huggins	...	19	Huggins, not out	...	12
C. Kearton, b Poole...	...	0	J. Gallop, b Vernon...	...	1
H. B. Archer, not out	...	0	Poole, b Lyon	...	9
Extras	...	13	Extras	...	8
Total	...	118	Total	...	123

PAST V. PRESENT.—Played at the College on Wednesday and Thursday, July 19 and 20. Score :—

PAST.

H. C. Bell, c Hopton, b Vernon	...	10	c W. Osborn, b Lyon	...	0
G. Symons, b Vernon	...	0	c Lyon, b Hopton	...	2
E. Henry, b Lyon	...	6	b Lyon	...	26
D. Lindsay, b Vernon	...	7	b Hopton	...	2
H. C. Salt, b Vernon	...	0	c and b Lyon	...	1
E. Walford, c and b Lyon	...	8	c W. Osborne, b Hopton	...	10
H. Mathews, run out	...	0	c Bullock, b Lyon	...	3
G. May, c McDiarmid, b Vernon	...	2	c W. Osborn, b Hopton	...	1
F. H. Osmond-Smith, b Lyon	...	7	not out	...	0
W. W. Dobson, c Bullock, b Lyon	...	4	c Beardsley, b Lyon	...	1
H. Browne, not out	...	13	c and b Hopton	...	0
Extras	...	17	Extras	...	4
Total	...	74	Total	...	50

PRESENT.

J. Poore, c Salt, b May	...	7
H. Bullock, b May	...	9
G. Lyon, b Salt	...	37
W. Osborn, b Henry	...	89
K. McDiarmid, b Henry	...	8
H. Vernon, l-b-w, b Henry	...	0
E. Hopton, b Salt	...	6
C. Kearton, b Salt	...	8
H. B. Archer, st Walford, b Henry	...	17
A. Osborn, not out	...	24
H. Beardsley, c Symons, b Henry	...	16
Extras	...	14
Total	...	235

R.A.C. v. ROSELEIGH.—Played at the College on Saturday, July 22nd. Score :—

ROSELEIGH.

G. Hawkeswood, b Lyon	...	58
H. Elmes, b Lyon	...	0
F. Matthews, b Lyon	...	0
A. Hailing, b Lyon	...	4
B. Beard, b Lyon	...	2
A. Walton, b Lyon	...	19
E. Webb, l-b-w, b Lyon	...	1
B. Daunter, b Lyon	...	0
R. Elmes, not out	...	21
E. Henniker, b McDiarmid	...	1
W. Summers, c Poore, b McDiarmid	...	7
Extras	...	15
Total	...	128

R.A.C.

J. Poore, b H. Elmes	...	0
T. Bullock, c Hawkeswood, b Hailing	...	49
W. Osborn, b Daunter	...	8
G. Lyon, b Matthews	...	35
C. Kearton, b Hailing	...	20
A. Osborn, b Matthews	...	0
E. Hopton, c Hailing, b Matthews	...	1
K. McDiarmid, b Hawkeswood	...	32
H. B. Archer, c and b Hawkeswood	...	0
T. Hinds, b Daunter	...	1
H. Beardsley, not out	...	4
Extras	...	7
Total	...	157

R.A.C. v. CIRENCESTER.—Played at the College on Wednesday, July 26th.

Score :—

R.A.C.				CIRENCESTER.			
J. Poore, b Barker	...	...	8	S. Boulton, b Lyon	...	...	1
H. B. Archer, b Barker	...	...	0	Cecil Fowler, c Beardsley, b Hopton	...	...	9
G. Lyon, c T. Fowler, b Smith	...	...	8	C. Allen, b Lyon	...	...	20
T. Bullock, l-b-w, b Barker	...	...	5	J. B. Sivright, c Beardsley, b Hopton	...	...	0
W. Osborn, c T. Fowler, b Barker	...	...	14	R. J. Mullings, c B'dsley, b McD'rmid	...	...	31
K. McDiarmid, c C. Fowler, b Barker	...	...	0	C. H. Hardy, b Lyon	...	...	0
C. Kearton, b Barker	...	...	0	Rev. A. W. Barker, b Lyon	...	...	17
E. Hopton, b Allen	...	...	4	E. Fawcett, b McDiarmid	...	...	10
A. Burra, c and b Allen	...	...	9	W. E. Smith, b Lyon	...	...	1
A. Osborn, c Hardy, b Barker	...	...	0	T. H. Fowler, b Lyon	...	...	25
H. Beardsley, not out	...	...	0	Jennings, not out	...	...	13
Extras	...	...	5	Extras	...	...	20
Total	...	...	53	Total	...	...	147

The bowling and batting averages will be given in our next issue.

LAWN TENNIS.

The Tennis has been slightly more successful than in recent seasons ; 4 matches have been won and 5 lost.

The Challenge Cup (Singles) was won by R. Samazeuilk, M. de la Gandara being runner up ; and the scratch doubles by R. Samazeuilk and W. Osborn, Messrs. Stoddart and Moron being runners up.

The following gentlemen received their colours :—F. de la Gandara (captain), R. Samazeuilk, Prof. Locke, Prof. West, Prof. McClellan, and M. de la Gandara, and the thanks of the club are also due to Prof. Woodley and Messrs. Beardsley, Stoddart, Piha, and Whittington for assistance in some of the matches.

R.A.C. v. Mr. J. A. ROSS-HUME's VI.—Played at home on Wednesday, June 7th, after severe rain, our opponents turning up a pair short. They lost three matches by default, and the match resulted in a win for the College, 6—3. Details :

Prof. Locke and R. Samazeuilk

lost to J. A. Ross-Hume and Rev. C. W. Tyler 5—7 3—6
beat Dr. H. Marshall and L. H. Hardy 6—3 6—1

Prof. McClellan and Prof. West

lost to J. A. Ross-Hume and Rev. C. W. Tyler 3—6 2—6
beat Dr. H. Marshall and L. H. Hardy 6—2 6—1

H. H. Beardsley and G. Stoddart

lost to J. A. Ross-Hume and Rev. C. W. Tyler 2—6 8—10
beat Dr. H. Marshall and L. H. Hardy 6—4 9—7

R.A.C. v. Mr. R. J. MULLINGS's VI.—Played at home on Wednesday, June 14th, when the College lost by 6 matches to 3. Details :

F. de la Gandara and Prof. West

lost to Rev. R. V. L. Dashwood and Dr. H. Marshall 2—6 1—6
lost to Rev. T. A. B. Cardus and R. J. Mullings 5—7 3—6
lost to C. A. Cooke and M. Hayward 6—3 6—8 3—6

R. Samazeuilk and Prof. Locke

lost to Rev. R. V. L. Dashwood and Dr. H. Marshall 2—6 6—3
5—7

beat Rev. T. A. B. Cardus and R. J. Mullings 9—7 6—1
beat C. A. Cooke and M. Hayward 6—2 6—2

H. H. Beardsley and M. de la Gandara

lost to Rev. R. V. L. Dashwood and Dr. H. Marshall 4—6 1—6
lost to Rev. T. A. B. Cardus and R. J. Mullings 6—2 4—6 1—6
beat C. A. Cooke and M. Hayward 6—0 4—6 8—6

R.A.C. v. REV. T. F. BURRA'S VI.—Played at home on Saturday, June 24th, and resulted in a win for the visitors by 6 matches to 3. Details :

F. and M. de la Gandara

lost to C. A. Turner and W. R. Carles 2-6 2-6
lost to Revs. T. A. B. Cardus and R. V. L. Dashwood 1-6 1-6
beat Rev. T. F. Burra and A. R. Canning 4-6 6-2 7-5

R. Samazeuilk and Prof. Locke

lost to C. A. Turner and W. R. Carles 4-6 4-6
lost to Revs. Cardus and Dashwood 6-3 5-7 0-6
beat Rev. Burra and A. R. Canning 6-1 6-0

Prof. West and G. Piha

lost to C. A. Turner and W. R. Carles 2-6 3-6
lost to Revs. Cardus and Dashwood 1-6 1-6
beat Rev. Burra and A. R. Canning 3-6 10-8 4-2 retired

R.A.C. v. EAST GLOUCESTERSHIRE.—Played at home on Thursday, June 29th, and resulted in a win for the visitors, after some stubbornly contested sets, by 8 matches to 1. Details :

F. de la Gandara and Prof. McClellan

lost to R. C. West and A. W. R. Cheales 2-6 retired
lost to E. D. Farren and Dr. R. Armitage 4-6 10-8 1-6
lost to F. Dyer and A. E. Carden 14-12 2-6 1-6

R. Samazeuilk and Prof. Locke

lost to West and Cheales 2-6 0-6
lost to Farren and Armitage 4-6 5-7
beat Dyer and Carden 6-3 7-5

Prof. West and H. H. Beardsley

lost to West and Cheales 0-6 1-6
lost to Farren and Armitage 4-6 2-6
lost to Dyer and Carden 3-6 2-6

R.A.C. v. R. J. MULLINGS'S VI.—Played on Wednesday, July 5th, when the College won 7 matches to 2.

F. de la Gandara and Prof. Locke

beat Revs. Dashwood and Burra 4-6 6-2 6-3
beat C. Gouldsmith and Gooch 6-1 6-2
beat M. Hayward and Rev. A. W. Barker 6-0 6-1

R. Samazeuilk and M. de la Gandara

beat Dashwood and Burra 6-4 6-3
beat Gouldsmith and Gooch 6-3 6-0
beat Hayward and Barker 6-0 7-5

Prof. West and A. Whittington

lost to Dashwood and Burra 5-7 6-3 4-6
lost to Gouldsmith and Gooch 4-6 6-2 8-10
beat Hayward and Barker 4-6 7-5 6-1

R.A.C. v. DR. H. MARSHALL'S VI.—Played at home on Wednesday, July 12th, when the visitors won the odd match.

F. de la Gandara and Prof. Locke

beat Rev. R. V. L. Dashwood and Dr. H. Marshall 6-4 3-6 6-2
lost to Rev. T. A. B. Cardus and R. J. Mullings 2-6 8-10
beat E. F. Ball and C. Toynson 7-5 6-2

G. Stoddart and M. de la Gandara

lost to Dashwood and Marshall 2-6 2-6
lost to Cardus and Mullings 6-2 4-6 3-6
beat Ball and Toynson 6-0 8-6

Prof. West and Prof. Woodley

lost to Dashwood and Marshall 4-6 5-7
lost to Cardus and Mullings 3-6 6-8
beat Ball and Toynson 8-6 4-6 6-0

R.A.C. v. COTSWOLD L. T. C.—Played at home on Saturday, July 15th, when the College won all 9 matches.

F. de la Gandara and Prof. Locke
 beat F. C. Brain and H. Freegard 6—4 6—0
 beat W. Hawes and E. Townsend 6—3 6—0
 beat R. Wilkes and C. Littleford 6—1 6—1

R. Samezeuilk and M. de la Gandara
 beat Brain and Freegard 6—2 6—3
 beat Hawes and Townsend 6—1 6—1
 beat Wilkes and Littleford 6—0 6—0

Prof. McClellan and Prof. West
 beat Brain and Freegard 6—0 6—1
 beat Hawes and Townsend 6—2 6—0
 beat Wilkes and Littleford 6—1 6—0

PAST v. PRESENT.—This match took place upon Thursday, July 20th, after the early termination of the cricket, when the Past, who were somewhat weakly represented, lost every match. Details :

R. Samazeuilk and M. de la Gandara
 beat H. S. Mathews and H. C. Salt 6—0 6—1
 beat E. Walford and Major H. McClellan 6—1 6—2
 beat F. H. O. Smith and H. G. Browne 6—1 6—0

F. de la Gandara and Prof. Locke
 beat Mathews and Salt 6—3 5—7 6—4
 beat Walford and McClellan 6—1 5—7 6—1
 beat Smith and Browne 6—3 6—2

Prof. West and Prof. McClellan
 beat Mathews and Salt 6—3 3—6 6—1
 beat Walford and McClellan 6—4 6—0
 beat Smith and Browne 6—2 6—2

R.A.C. v. EAST GLOUCESTERSHIRE.—Played at Cheltenham on Saturday, July 22nd, when the home team defeated us by 6 matches to 3. Details :

R. Samazeuilk and M. de la Gandara
 lost to A. Grimley and A. W. Cheales 1—6 1—6
 beat A. E. Carden and H. Dyer 6—2 7—5
 beat A. Leeds and H. Bagenall 7—6 6—2

F. de la Gandara and Prof. Locke
 lost to Grimley and Cheales 2—6 2—6
 lost to Carden and Dyer 6—2 6—7 3—6
 beat Leeds and Bagenall 1—6 7—5 6—3

Prof. West and Prof. McClellan
 lost to Grimley and Cheales 1—6 1—6
 lost to Carden and Dyer 4—6 2—6
 lost to Leeds and Bagenall 3—6 4—6

REVIEWS.

THE JOURNAL OF AGRICULTURAL SCIENCE. Vol. I., pt 1. Edited by R. H. Biffen, A. D. Hall, T. H. Middleton, and T. B. Wood. Cambridge: at the University Press. January, 1905, pp. 148, 5s. net.

This is the first part of a Journal which it is proposed to issue as material accumulates, probably in quarterly parts of about 100 pp. each, with plates and figures. It is intended to publish original papers on all scientific subjects bearing on agriculture, as well as *resumés* or critical articles on the recent advances in the various branches of Agricultural Science, articles from Colonial and Indian workers, and reviews and discussions. Many original papers are too technical for publication in the journals of societies dealing with pure science, and at the

same time not sufficiently popular for inclusion in the Journals of the Agricultural Societies or of the Board of Agriculture; these now sometimes get published in College Magazines, County Council Reports, and the like, where they have but a restricted circulation and for the most part become lost. It is hoped that the best of these will now find a place in the Journal where they can be readily referred to. To teachers of higher agriculture and allied subjects, also to land agents, farmers, and to manufacturers, seedsmen, &c., who deal with farmers, and all who have an interest in the scientific side of farming, this Journal should prove of considerable value. This first number contains an article by R. H. Biffen, M.A., of the Agricultural Department, Cambridge University, on "Mendel's Laws of Inheritance and Wheat Breeding." Mendel's laws of inheritance were enunciated in 1865, but were, apparently, entirely overlooked till the beginning of this century, when Mendel's paper was unearthed simultaneously by De Vries, Correns, and Tschermak. They have proved very stimulating and the present paper is an outcome of their application to an endeavour to improve English grown wheat and to obtain "stronger" strains. The results are at present incomplete but promise to be of great interest. There are also papers by Albert Howard, M.A., F.L.S., on "the Influence of Pollination on the Development of the Hop"; by A. D. Hall, M.A., on "the Analysis of the Soil by means of the Plant"; by S. H. Collins, F.I.C., on "Variation of the Chemical Composition of the Swede"; by T. B. Wood, M.A., and R. A. Berry, F.I.C., on "Soil analysis as a guide to the manurial treatment of poor pastures"; and by Prof. T. H. Middleton, M.A., on "the improvement of poor pastures." Mr. John Golding, F.I.C., contributes a preliminary note on "the importance of the removal of the products of growth in the assimilation of nitrogen by the organisms of the root nodules of leguminous plants"; in his experiments the nitrogen-fixing organisms were grown in a suitable medium on a Chamberland filter-candle so that the products of growth could be removed. Under these conditions the assimilation of nitrogen was greatly favoured. Dr. Bernard Dyer sends a note on analyses of Town Stable Manure; and Mr. A. D. Hall on the newest nitrogenous manure, Calcium Cyanamide, with which preliminary experiments have been made at Rothamsted. The papers are all of a high order of merit, and the promise of the Journal is remarkably good.

A FURTHER CONTRIBUTION TO THE FRESHWATER PLANKTON OF THE SCOTTISH LOCHS. By W. West, F.L.S., and G. S. West, M.A., F.L.S. Transactions of the Royal Society of Edinburgh, Vol. XLI., Part 3, pp. 477-518, 1905.

The authors have now examined the plankton of thirty-six lochs of Scotland, mostly in the North-West and in the outer Hebrides. Their former paper was published in the *Journal of the Linnean Society*, bot., vol. xxxv., 1903, and gave an account of the plankton of fourteen lakes. The present is a further important instalment with seven quarto plates; five of these are reproductions from photomicrographs and two from drawings from nature, all by Professor G. S. West. The Scotch plankton is very rich in Desmids; in this respect it is approached, in foreign countries, only by the Swedish plankton of any hitherto examined. The authors attribute this rich Desmid-flora to the existence of the Older Palæozoic and Precambrian formations of the areas in which the lakes are situated. A similar Desmid-flora is found in the plankton of those English lakes, and lakes of North Wales and West Ireland which are situated on the Older Palæozoic formations. The abundance of Desmids seems due to the absence of lime and presence of humic acid in the water, conditions due to the geological nature of these areas. The diversity of the Desmid-flora and the presence of some of the handsomest species of the family appear to be directly connected with the antiquity of the geological formations. The Desmids were originally derived from the pools and bogs of the mountains, and only those species have flourished which could adapt themselves to existence as pelagic organisms; some of these have in course of time produced distinct and characteristic plankton varieties.

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No. 5.

THE BOARD OF AGRICULTURE AND ITS WORK.

It is largely the fashion to decry the work done by the Board of Agriculture as of little practical value to the farmer, but such an attitude is, I believe, based mainly upon ignorance as to what that work has been. A few lines, therefore, from one who, for something over ten years, had an opportunity of studying the policy of the Department from the inside may be of interest to the readers of the *R.A.C. Students' Gazette*.

I am all the more pleased to throw some light on this subject in that many of your readers are destined to hold important positions in the agricultural world, and a knowledge on their part of the lines upon which the Department responsible for their interests is acting can only be to the advantage of all concerned.

In the first place, the Department, under the able direction of Sir Thomas Elliott, K.C.B., has been divided and sub-divided into a number of Divisions under responsible Assistant Secretaries, viz.:

1. THE LAND DIVISION, under Major Craigie, C.B., dealing with Inclosures and Commons, Copyholds, Tithe, Lands Improvements, and Agricultural Statistics.

This Division continues the work of the Old Land Commissioners, and is one with which Land Agents must often come into contact under one or other of the many statutes dealing with real property. Compared with the other Divisions, its work may seem somewhat uninteresting, being less intimately connected with the everyday life of the agriculturist; but many old Cirencester men, now responsible for the management of rural and urban estates in every part of Great Britain, will vouch for the importance of the work carried on by Major Craigie and his staff.

2. THE ANIMALS DIVISION, under Mr. Arthur Anstruther, in which may be included the Veterinary Department.

It is difficult perhaps, nowadays, when the United Kingdom has been freed from the more disastrous forms of animal disease, to give to the Animals Division of the Board its due meed of credit for the effectiveness of its work. Many farmers, I fear, look upon the Department as one of the necessary evils of life, whose object it is to place unnecessary restrictions upon the ordinary movements of sheep or pigs. The scourge of cattle plague is forgotten; the terrors of foot and mouth disease are lost in dim distance; pleuro-pneumonia and rabies are things of the past; and the losses sustained by agriculturists, before the eradication of these pests was effected, belong to an earlier

generation. It is hardly possible at the present time to attempt any estimate of what these diseases cost the country in fatalities, or in the deterioration of farm stock, but it is interesting to remember that the last great outbreak of foot and mouth disease is said to have taken two and a half millions sterling out of the farmers' pockets, without counting the almost equally great loss which must have followed on the restrictions on movement, the closing of markets, and the general dislocation of the live stock trade.

At the present moment the Animals Division is attacking, apparently with some considerable success, the less dangerous, but still troublesome, pests of sheep scab and swine fever, and I sincerely hope that they may depend upon the support of all R.A.C. men in carrying on their good work. A few words of explanation, delivered at a rent audit dinner or a farmers' club meeting, as to the reason for certain Orders, may prove of the greatest value towards the end in view, for success in such matters must to a great extent depend upon the goodwill and co-operation of those immediately concerned.

Under this Division comes also the supervision of the ports at which foreign cattle are slaughtered, and of the markets and railways throughout the kingdom.

The outdoor work is carried on by a staff of inspectors, which has included, among other members of the R.A.C., Pelham Clinton, Dunne, Witley, Wason, and myself.

3. THE INTELLIGENCE AND EDUCATIONAL DIVISION, under Dr. Somerville, is, perhaps, that most closely in touch with the ordinary everyday work of the farm. Questions as to insect or fungus pests are dealt with here, and advice by experts may be obtained on almost every matter pertaining to agriculture and agricultural life. Land agents and farmers will find the Intelligence Division ever ready to assist with advice or information on points of difficulty. Up to the present time their own difficulty has been to bring this fact to the knowledge of their constituents, and if any words of mine should have the effect of to some extent remedying this, my object in writing these lines will have been attained. With the same object in view the late President of the Board, the Earl of Onslow, appointed a large number of representative gentlemen in all parts of the country to act as Agricultural Correspondents, their duty being to consult with farmers in their districts, and to bring to the notice of the Department any suggestions as to new directions in which the energies of the Board might be advantageously applied.

This Division prepares and issues the leaflets, which now number upwards of one hundred and fifty, and deal with every variety of subject coming within the farmer's ken. I should advise anyone who has not already done so, to obtain from the Department a list of these valuable publications, which may be obtained free of cost, even the letter of application requiring no stamp.

These leaflets, besides being obtainable singly, are now published, for convenience of filing, in eight sections, obtainable at 1d. per section, viz. :

1. Miscellaneous subjects, *e.g.*, Rating, Income Tax, Employers' Liability, &c.
2. Farm Animals, Diseases, &c.
3. Poultry and Bees.
4. Farm and Garden Crops, Cultivation, &c.
5. Wild Animals and Birds.
6. Insects injurious to Crops.
7. Insects injurious to Fruit and Forest Trees.
8. Fungi injurious to Crops and Fruit.

Much has also been done of late years by this Division to insure the purity of manures and feeding stuffs, and to protect the producer from unfair competition through the adulteration of milk, butter, and other farm produce.

It would be difficult in a short article to refer to everything done by the Board to help the interest committed to their care, but I may be permitted to refer to one more point. I mean that of railway rates and the facilities provided for the carriage of farm produce. The late Mr. Hanbury first took up this subject, repeatedly asking the audiences at his many public meetings to bring their difficulties in this, as in other matters to his notice, and his initiatory efforts have since been ably seconded by Lord Onslow and Mr. Ailwyn Fellowes. The result of their efforts has been to give rise to a better understanding between agriculturists and the railway companies, and Mr. Fellowes now suggests that when difficulties are experienced, either through excessive rates or lack of facilities, the Board should be informed of the facts, with a view to their arranging a conference between the complainants, the representatives of the companies, and an officer of the Board. Several such conferences have already been held with most excellent results.

May I then, in conclusion, re-echo the words which have so often fallen from the lips of the last three able Ministers of Agriculture, viz., that the Board was made for the farmers, and not the farmers for the Board, and that both Minister and staff have but one earnest desire—to take an active part in developing the interest entrusted to their care.

A. GODDARD, M.R.A.C.,

Late Private Secretary to the Right Hon. R. W. Hanbury, M.P.,
and to the Right Hon. the Earl of Onslow, G.C.M.G.

SPORT IN BRITISH COLUMBIA.

Thirty years ago, when the hardy adventurers who had been attracted by the news of gold settled in the valleys of British Columbia, that country was indeed a hunter's paradise. At that time the wild game was never disturbed by the hunting parties with their noisy retinues, which the transcontinental railways now pour into every accessible game district.

The Indians as yet had nothing more accurate to shoot with than a

Hudson Bay musket, whose value in their eyes depended on the great length of its barrel—which length of barrel measured the height of the pile of beaver skins which was its price in the stores of the Company. So the old-timer with his accurate Sharps or Winchester rifle, when he could spare time from taming the wilderness and making a home for himself, could always find game to shoot at.

With few exceptions these early settlers had Indian wives, who toiled faithfully for them, and helped to raise families of half-breeds. These were only discarded when the white woman came and squaw wives were looked down upon.

These half-breeds, whose education was well looked after by the Roman Catholic priests at the Missions, became the cowboys and guides of the country, but did not take kindly to the routine of farm work and often were demoralized by whiskey and gambling.

One day about 12 years ago, an Indian from the Penticton reserve called at my ranch at Okanagan Mission, with a view to getting an old mower in exchange for a horse which he wished to sell. I promised to go and see the horse when I had time, so having finished the haymaking and my grain not being ready to cut, I started off one morning riding a strong pony called Sidy, from his habit of sticking to one side of the road. An English lad rode another pony, and we went as light as possible, carrying only sufficient food for a few days' trip.

Next day we saw the Indian at Penticton, and arranged for him to run in some of his horses from the range while I rode up the cañon and searched some of the likely places for bighorn, but without success. At this time the laws of British Columbia permitted hunting wild sheep during August.

Hardy and I camped the next night by a little brook on the Indian reserve, and I shall never forget kneading the dough for some bannocks while thousands of mosquitoes were busy trying to suck the blood from my neck and face. We afterwards found that the Indians had abandoned this spot on account of the mosquitoes at this season, and we fully appreciated their wisdom.

I failed to make terms with Phillip for the horse, but having met the noted hunter Charlie, who had guided two of us in a sheep hunt a few months before, I arranged with him, after some bargaining, to take a flying trip into some mountains to the south, where he said the big rams retired from the flies during the hot weather of August.

Having started the boy Hardy on his way back to the ranch, I got what few extra groceries were needed for the trip and prepared to start early on the next day.

Riding in the cool of the morning along the edge of the reserve, Charlie and I came suddenly upon a white-tailed deer which was browsing quietly near the path. I made no attempt to shoot him, as I did not wish to delay our progress to the sheep ground, but Charlie, who saw the prospect of some meat for his household, made frantic efforts to untie his rifle while the deer stood looking at us. At last to my relief the deer jumped into the brush, and Charlie was deprived of his meat.

Unlike the ordinary black-tailed deer, these white tails keep to the timbered flats of the valleys, and so cunning are they that they seldom get shot, and a chance like this one was very rarely got.

By noon we had left the Okanagan Valley, and were picking our way up a narrow cañon among the boulders in the bed of Sawmill Creek. Getting to a shady spot where there were a few square yards of level surface, Charlie pronounced it a good place to camp, so leaving him to look after the horses and straighten things, I went up the mountain to look for a deer. I was lucky enough to find one and shoot it, and so we had enough fresh meat for a few days at any rate.

Now that the deer have most of them gone the way of the buffalo, it is not safe to go into the mountains without plenty of provisions, but at the time of which I write some flour, salt, and a little fat to fry the venison with were all that was necessary.

Before the sun was in sight next morning Charlie and I were far up the mountain side making our way to the grassy openings where the bighorns were : we soon found a place where they had been lying, fighting the flies on these hot days, and the ground, which was worn bare by their pawing, smelt just like a sheep pen. Soon Charlie spotted some light coloured objects about half a mile off, which he said were all old rams, and by making a wide detour, so as to prevent them winding us, we got at last across a lot of fallen timber to a rock, from which we could see, not 100 yards away, seven bighorn rams grazing away wholly unconscious of our presence. The Indian had hurried so over the fallen timber, that when I came to aim at the ram which he said was the biggest, the little ivory bead front-sight wandered promiscuously all over the body of that ram. How I tried to keep it steady for an instant on his shoulder, but the harder I tried, the more it wandered. At the shot away went the sheep helter skelter over the rocks, and only a few drops of blood remained to show I had not missed.

Following the tracks, I heard a noise just ahead and not twenty yards away saw for a few seconds a grand pair of horns and a pair of eyes staring straight at us. Before I could shoot he was gone, and we never saw the bighorn of our dreams again. Sad were my feelings for the rest of that day, and I got no comfort from the words of the Indian in Chinook, "All same King George tyee, guansum cultus shoot." Just like the English gentleman, always shoot badly.

Another morning we got within shot of three or four rams on a rocky knoll on the edge of the timber, and taking a steady shot lying down, I brought down the biggest one, and running up got another which had turned back to see what was the cause of the noise.

Beyond where these rams fell was a huge ravine, littered over with fallen and dead timber, and from here we could hear a tremendous noise, which I put down to a wounded sheep in its efforts to escape. We stared in the direction of the noise, hoping to catch sight of the animal, when we heard a savage growl, and we knew that we had been within a few yards of two grizzlies. They were in such a hurry to get

away that the last one had crowded too closely behind the first and hence the growling.

During the next two days we saw several more sheep, but they were all of small size and we did not molest them: the firing seemed to have frightened the big ones away, so we packed up one evening and I started for home, riding old Sidy, and leaving Charlie to follow with the heads, skins, and some of the meat, which he was to put on the steamboat at Penticton next day. I took some bread and meat in my pocket, intending to ride the fifty odd miles back to the ranch without a stop. The way for the first twelve miles lay along the floor of the cañon, above which towered the cliffs of rock, where were the ewes and lambs of the bighorn at this time.

Once out in the main valley I thought I would have no trouble in finding the trail even at night, so I gave the old horse his head and trusted to him. After a while, the old horse came to a dead stop on top of a hill, below which shone the waters of Dog Lake, on the other side of which Charlie and I had ridden down.

It was now too dark to hunt for the trail, so I unsaddled, and after hobbling Sidy, lay down under the saddle blanket and slept until it was light enough to find the right trail.

It turned out to be only a few hundred yards away and the horse had wandered off it, along a cow path made by the stock cattle which ranged here all the summer.

In the mountains both East and West of this lake are bands of really wild horses, which are the descendants of horses lost by settlers in years gone by, and they have multiplied to such an extent that they are a nuisance and are often shot by the white settlers, because being wilder than deer they are most difficult to capture and when caught are of little value as a rule.

By 8 a.m. I had passed the ranch of T. Ellis, who was and is one of the cattle kings of British Columbia and whose thousands of cattle graze the foothills for 25 miles North and South.

When riding up the steep and rocky trail of the mountain which I had to cross before the fertile Minion Valley would be in sight, a strange thing happened. The old horse had his head within a foot of the ground as usual, intent on getting back as soon as possible to his favourite range, when straight along the trail towards him came a deer, which with his head down was too worried by the flies to see anything in front of him. I let the old horse alone and the two animals walked till within six feet of one another and then each commenced bowing his head to the other until the deer, seeing me, beat a retreat.

We got home about 2 p.m. and found everything satisfactory at the ranch and the grain about ready to be cut.

In this wild country, sport often entailed great toil and hardships, but to compensate for this it often came to one unsought.

One bright day in the winter we had been carrying hay from some stacks on the irrigated flat about three-quarters of a mile from the house and had allowed the sheep to wander alone along the face of the

hills, where the sun had cleared away the snow. The sheep were in plain sight all the morning and not more than a few hundred yards away from us most of the time, or we would not have trusted them without a herder. After eating dinner the men and I were looking up at the sheep, which by now had worked their way back to the steep bluffs just above the farm yard, and we wondered why they had returned so early, when we spied two coyotes sitting on their haunches just above the sheep watching them quite unconcernedly.

Grabbing my Mauser rifle, which was always ready for such emergencies, I got on the little pony which was ready saddled in the stable and rode up to a bush out of sight of the coyotes and tied the mare.

Up here the snow was six inches deep, and before I had gone far I met one of the coyotes trotting towards me to see what was there.

I could only see his head over the ridge of snow and missed him badly, but as he went off like a blue streak I slammed another cartridge into the chamber and aiming well ahead let drive again. I only saw a whisk of his tail after the shot, and not stopping to investigate further I ran on to look for the other. A long shot at about 200 yards, and he crawled up the face of the hill leaving blood tracks all the way. Seeing he was wounded and having only one or two cartridges left in the magazine, I returned to the ranch for one of the men and a colley bitch and her three full-grown whelps, which I could now enter to coyotes. Murray and the dogs soon found the wounded coyote and ran him to bay under the roots of a pine stump, where after much shouting on our part and howling by the dogs when one of them got bitten they soon put him out of his pain.

The noise brought up my neighbour Bob White panting from the valley below, and when we had found the coyote which I had first shot at with a hole in his head, we were delighted at the death of the two sheep-killers.

Bob White had noticed these animals watching the sheep during the morning, but seeing the sheep not alarmed he thought they were my young colleys, which they resembled. I had only just before put some new bells on the sheep, and the coyotes had evidently not heard bells before or there would have been another tale to tell.

These sneaking brutes are a constant menace to the owners of sheep, pigs, and poultry in the West, and, once they have tasted sucking pig or young lamb, are most persistent in their attentions until their career is cut short by strychnine or the rifle.

Talking about strychnine, I once dragged the carcass of a sheep which had died a mile or more from the ranch on to a high hill where coyotes were often seen, and put some poison here and there over the flesh. Though it was midwinter at the time and snow lay deep on the ground, not a single coyote touched the meat, although the ground around was covered with their tracks.

Bears, too, are very fond of young pigs, and before the bush had been cleared by the settlers I several times heard the death cry of a

porker struggling in the claws of a bear. Black bears are the greatest sinners against the stockman, the grizzly generally avoiding the haunts of man and devoting his attention to roots, deer, or ground-squirrels. When he does start killing domestic animals, however, his great size and strength make him formidable, and nothing is too big for him to tackle.

During two successive springs before I left British Columbia a large grizzly had killed between 20 and 30 head of cattle of all sizes, dragging some of them 50 yards or more, and had so far evaded all attempts to kill him.

Many times I have listened to bear stories told by Indians round the camp fires at night when hunting in the mountains, and in describing the two bears they would say "Black bear all same mowitch, grizzly capit yacca cultus." Black bear just like deer, only the grizzly dangerous or wicked.

Nowadays bears stick pretty closely to the timber, and only feed during evening and early morning, consequently it is almost impossible to approach them by ordinary stalking. They are exceedingly fond of horseflesh, and I once got great sport watching the carcass of an inveterate bucking horse, which I sacrificed for the purpose, and shooting at three bears, two grizzlies and a black. The black fellow got away, but the skins of the grizzlies are amongst my most treasured trophies.

To me, however, the chase of the bighorn possesses a fascination greater than that of any other animal. Like his domestic congener, he despises the shade of trees except during the fierce heat of summer. Let us hope that the day is distant when this noble animal will disappear from the bluffs and ledges of the Rocky Mountains, which alone can give him security against his enemies.

J. T. DAVIES, M.R.A.C.

THE IMPORTANCE OF SCIENTIFIC KNOWLEDGE.

ABSTRACT OF INAUGURAL LECTURE BY DR. MARSHALL WARD.

On Wednesday, October 11th, an important inaugural lecture was delivered by Dr. H. Marshall Ward, F.R.S., F.L.S., F.R.H.S., &c., the distinguished Professor of Botany in the University of Cambridge, and a large and interested audience assembled in the lecture theatre for the occasion. The chair was taken by Earl Bathurst, C.M.G.

Professor Ward, in the course of his weighty and suggestive address, said he would keep as his basis his own subject of botany, which it was sometimes now the fashion to describe, in the form in which he taught and learnt it—for it was never too late to continue that part of their work—as academic botany. There was, however, not much gained by the use of adjectives of that sort. Botany meant the study of plant life, and that study had in modern times meant more and more the watching an individual plant from its babyhood to adult age, to senescence, and death, and the study of death was not the least

important part. It was what a plant did that had been attracting the attention of modern botanists for the last 40 or 50 years, and botany in the form in which it particularly interested agricultural students was not older than about 1850 to 1860. Agriculture was the oldest of the arts, with the possible exception of hunting, and forestry probably came next, though the forester of primitive and pre-historic times of course confined his operations to the devastation of forests to meet his growing needs. In the time of the Greeks and Romans agriculture reached a high point, but in mediæval times no progress was made for two or three hundred years—everybody did what his father did before him, which was not progress. The gathering of information on the part of one person and transmitting it to another was often called science, sometimes it was called knowledge, sometimes it was called learning, but all three were a misusage of words. It was merely information, and information was not knowledge: it did not become knowledge till it had been digested, thought over, applied, and tested by experiment, by which time they had reached the scientific stage. He denied that until quite recently agriculture was a science in any sense of the word, except in the hands of a few individuals. He also denied that forestry was a science until quite recently; indeed, even now its claims to be considered a science were very small indeed. A vital change, however, came over agriculture when it threw itself into the arena and challenged experiment. As soon as agriculturists condescended to experiment, condescended to take advice and then test it, and did not confine themselves to the argument which had done so much mischief that what their fathers and grandfathers had done they must do, from that point agriculture and forestry had become sciences in popular phraseology, though in the true sense of the word they were applied arts. But since the “my father and grandfather” argument had been abandoned the progress had been so great that the difficulty was to say, not that agriculture was becoming scientific, but what branch of science it was not going to rake in to its aid. The ideal agricultural student was expected to know a considerable amount of chemistry, a good deal of zoology, a fair share of geology, and he ought to know a great deal of botany. Those were pure sciences—the fundamental natural sciences. He would say nothing of the mathematics and other things a student ought to know, but what he should like to complain about was that in some schools and colleges which he knew the sciences he had named were described as “subordinate branches of learning.” He wanted to impress on them that “subordinate” or “collateral” was not the word for those sciences. “Fundamental” was the word, for those were the sciences on which modern agriculture was built and based. While they were at college, students should realise that those fundamental subjects were the things that should be taken up and dealt with thoroughly. They could do the main of routine agriculture after they left that college, but he doubted if they would do much botany, or zoology, or geology, or chemistry after they left college. Their opportunities were now, and

if they were wise they would make the best of them. Every big packet of facts which they accumulated there and tied up for thinking over for their future assistance would become packets of knowledge, and every real packet of knowledge they carried away from that place would prove of value to them in after life, direct as well as indirect. He exhorted them to carry enthusiasm and respect for those fundamental subjects into their work, for if English students would only take an interest in their work he was sure, from his extensive experience on the Continent, there was no race they need fear to compete with. He was once discussing with a friend the shocking results in a certain examination, while the same college had obtained excellent results in football and rowing. But why did they not get the same results in both cases. It was because the same interest and enthusiasm were not put into the one as into the other. For some reason or other the English student often suffered, not from a lack of brains, but from a lack of interest, because he thought that this and that particular subject were of no advantage to him. That was the key to the whole situation. If they came there with the idea that half their studies were going to be of no importance to them in after life, they would take their work in a slack sort of style and not make much progress. But, on the other hand, if they had a good grip of the relative importance of those things, then they would at the beginning of their work in the laboratory and at lectures take an active interest in all these fundamental subjects, and not fall into the mistake of believing that their purpose would be served by devoting their attention solely to the subjects labelled "Agriculture" or "Forestry." They could not afford to neglect the fundamental subjects to which he had referred, because if they did, when they came to plan an agricultural experiment they would make the same mistakes as were made in planning the experiments over which so many thousands of pounds were wasted by the County Councils in the early days when they were feeling their way. Every scientific man could have said where those experiments must fail, because they were not based on scientific plans—they were not experiments that could succeed.—Dr. Ward proceeded to take two instances from his own subject to illustrate the enormous practical value which had in recent years followed from botanical research, first in regard of Forestry, by the discovery of the action of the fungus which caused trees to become "rotten." The second illustration applied to agriculture, equally with forestry, viz., the discovery that the microscopic hairs covering the roots of forest trees did not belong to the tree itself, but belonged to a fungus growing in the leaf mould in which the tree's roots were situated. He described the influence which this fungus exerted on the growth of plants, and indicated as an example the important effect which the discovery had produced on the cultivation of orchids. Having pointed out that these were only two examples out of multitudes that might be given of the essential importance of having a scientific basis for their studies of agriculture and forestry, Dr. Ward said in conclusion that he had had no desire in what he had

said to do anything in the nature of preaching. He had simply spoken as one student to other students in order to show them that the great key to knowledge was interest in their work, for then they would respect it, they would respect those subjects he had been speaking of, they would realise that they were fundamental, the subjects on which their studies were really based.

BELGIAN WOODLANDS AND THEIR MANAGEMENT.

NOTES OF A PAPER READ AT THE COUNTRY CLUB ON DECEMBER 5TH, 1905, BY F. H. OSMOND-SMITH, M.R.A.C.

The revival of interest evinced by landowners and their agents in the management of woods was shown by the large number of members of the Royal English Arboricultural Society who availed themselves of the opportunity lately afforded them by the Belgian Government of visiting the State forests of Belgium, and woods belonging to municipal bodies and private owners. M. Crahay, Inspector of Woods and Forests, who was deputed by the Belgian Government to act as guide to the members of the Society, showed indefatigable energy and courtesy in explaining the systems adopted in the various woods visited, and his efforts made the tour successful and pleasant, and won him the gratitude of every member present. The woodlands belonging to the State, to municipal bodies, and to public establishments, were brought under public control about the middle of the last century. Though Belgian law allows owners of private woods practically full control in the management of their properties, it requires them to take special measures to prevent the trees being injured by the attacks of insect pests, this important provision is mainly responsible for the healthy state of Belgian woods. With this single exception the Belgian landowner has full liberty of action, and he is still permitted to destroy his forests. Hence a large number of owners have cut vast areas of woodland, which have never been replanted for timber, and as the demand is increasing considerably, the Belgian Government recognised that this important matter cannot be dealt with by private individuals, but only by the State.

Since 1897 the Government has acquired 15,000 acres, and planted them. The Belgian Government has no power to compel municipal bodies possessing waste lands to plant them, but every encouragement is given by offering important subsidies and by organising annual conferences to induce them to do so. Officials are also deputed to advise private owners in the management of their woods, and this admirable provision enables them to obtain the best possible advice and to maintain the woods in a high silvicultural condition.

Forest guards (corresponding to our woodmen) are recruited from old soldiers, and courses in silviculture are given for their benefit at Bouillon and Diest ; whilst forestry instructors give lessons in forestry in all the forest regions in Belgium, in order that recruits may qualify

for the forestry certificate, without which it is impossible for a forest guard to obtain employment in the State forests.

Firewood and bark make extremely poor prices, whilst the demand for timber is rapidly increasing, and for this reason there has been a tendency of recent years to convert the woods of coppice with standards, which is the prevailing system in Belgium, into highwood.

The Reservoir of La Gileppe and the Forest of the Hertogenwald were visited on the first day of the tour, the party leaving Spa for Vervier by train and driving from there to the Reservoir, and thence to the forest. In this district hornbeam appeared to be the prevailing underwood on the low land, and is valued highly, owing to its power of standing shade and affording a large amount of humus from the decomposition of its leaves; it is sold for firewood and for the manufacture of skittle-pins. Large numbers of acacia and mountain ash were also seen. On the stony spoil heaps on the hillsides approaching the Reservoir the white alder and birch were the predominating species, the latter occurring naturally, whilst the former were planted along with acacia; the latter plants, however, were entirely destroyed by rabbits, which did not touch the white alder, this tree sharing with Corsican pine the distinction of being practically immune from the attacks of these pests. Unlike the common alder, this species avoids moisture instead of seeking it, and is admirably adapted for planting stony hillsides and limestone slopes, as it throws out a large number of root-suckers, which bind the soil together, preventing soil-slides.

Adjoining the Reservoir was a sessile oak coppice, which it is proposed to convert into highwood. Up to the present it has been grown on a sixteen-year rotation, the produce being sold for fuel and bark, the larger poles being used for pit timber, for which there is an enormous demand. In woods in which the coppice with standards system is adopted, belts of underwood 20 feet wide are left uncut between the compartments of underwood to act as fire lines, as after cutting heather springs up in great profusion, and is one of the chief factors in producing the huge forest fires, which have done so much harm. The standards are sold the following year, as this affords both purchaser and vendor a better opportunity of seeing the quantity and quality of the trees. Surrounding the Reservoir, the main area of the woods consists of coppice with standards, the latter being oak, whilst the underwood consists chiefly of oak and birch. These are gradually being converted into highwood. The rotation of the underwood is extended to thirty years in some of the compartments, which will be cut twice or three times before being converted, in order that the process may be a gradual one and the annual income fairly constant. Where conversion is actually proceeding mature and dying trees are cut, the underwood thinned, and beech and oak planted.

On the drier soils, where heather abounds, pines are planted in place of the hardwoods; whilst on wet soils the latter are underplanted with spruce, the coniferous woods are thinned regularly and under-

planted with beech, with the idea of eventually forming pure beech woods. Although the fall in the price of bark and firewood is the chief reasons for converting underwood into highwood, there is an important subsidiary consideration, which tends to increase the area under conversion, and that is that underwood fails to kill the heather and broom, which are often responsible for forest fires, whilst highwood entirely eradicates them. One of the most striking features noticed on the ascent from the lower to the high lands was the limited number of species which can be grown on the various altitudes. On the lower zones, 770-1,300 feet, oaks, beech, maple, and sycamore were abundant; 1,300-1,590 feet, beech, birch, and Scotch pine were the prevailing species; whilst from 1,900 to 2,000 feet spruce and Weymouth were the only species that were capable of being grown with any success.

The southern part of the Hertogenwald is known as the Hautes Fagnes, and is especially unsuitable for the growth of trees owing to the soil and climate. The winter is very severe and of long duration, being accompanied by heavy rain, persistent snow, dense fogs, and heavy gales. The subsoil is composed of Cambrian slates and quartzites, which decompose and form an impenetrable clay, which prevents drainage and the downward passage of the roots; the surface is covered with a peat bog, which often attains a depth of 10 to 15 feet; the soil is poor in lime and phosphates. Under such unfavourable conditions as the above it reflects great credit on the Belgians that they should have succeeded in forming woods and plantations which yield a good return for the money expended on them.

The method of planting as demonstrated to the members of the Society is, briefly, as follows:—Drains are dug about 13 feet apart and 2½ feet deep, the excavated soil being thrown alternately to the right and left of the trench. The whole area is divided by two fire lines, 60 feet wide, which are cut annually for hay, and subdivided by minor ones, each compartment thus having an area of about fifteen acres. These minor lines are sown with clover, lucerne, and other leguminous species, which are cut annually; two years after draining spruce are planted 5 feet apart in the rows and 7 feet between them, a hole being excavated in the mounds with a graduated semicircular planting iron, a mixture of good soil and basic slag being inserted with the plants to stimulate growth in their early stages, the cost of the slag being 10s. per thousand plants.

The woods are not thinned until they are thirty years old, only dead and dying trees being removed. The average length of the rotation is eighty years, when the woods are clear cut and replanted four years later. Although Weymouth pine is as suitable as spruce for planting in this district, none have been planted of recent years, owing to red deer being particularly partial to this species, whilst spruce is free from their attack. The spruce, however, has to contend with the fungus *Leptoria parasitica*, which is very prevalent, but does not do much damage to the trees.

The second day was devoted to visiting the Communal Woods of

Rochefort, in which region there are large areas of waste land totally unsuited for agricultural purposes. The soil is a limestone one, the wonderful crags of limestone being especially interesting to the geologists in the party. In the neighbourhood of Rivage, which was passed on the way to Rochefort, there are large areas of oak coppice, which is grown on a sixteen-year rotation, and realises £18 per acre, the good price realised in this district being due to the large demand for bark, which fetches £4 a ton in the neighbouring towns; whilst pit wood, as in other places, is in great demand.

The soil at Rochefort is calcareous, with a layer of impermeable clay some feet below the surface. The water drains away very quickly till this is reached; the soils on the south and west aspects are extremely dry in summer, whilst on the north and east there is far more soil and the timber is of much finer quality. On the former sites the choice of species is naturally very limited, the only species which can be grown successfully being Austrian pine, which thrives best on the poorest soils, Scotch pine, which does better on the deeper ones, and Corsican on the moister ones. Oak and beech were tried originally, but were a complete failure. Of these three species, the Austrian pine is the most successful. The wood of the Scotch is, however, of higher money value; but the greater bulk of the Austrian more than compensates for this. The pines in these woods are simply a preparatory crop for beech, as it is intended to cut out the Austrian pine and underplant the Scotch with beech where possible, in order to ultimately obtain pure beech woods. In forming a plantation the first step taken is to procure a crop of grass, as this prevents the plants being lifted by the frost; the age of the plants is one year, once transplanted, as nothing larger grows successfully. Stones are placed round them to prevent their lifting and to retain moisture. The trees are planted in holes 10 inches deep by 10 inches square, which are made with a planting pick on account of the hardness of the soil. Planting is done in the early autumn, in order that the plants may get a good start and be able to withstand the spring drought. The recognised width for planting is 3 feet 3 inches, 4 feet being the extreme limit. No thinning, except of dying trees, takes place till the trees are thirty years old.

The average height of an Austrian and Scotch pine plantation which was visited was found to be 36 feet: the average girths of the Scotch and Austrian pines were 15 inches and 18 inches respectively, whilst a few spruce of thirty years old which were seen in these woods were only 3 feet high, affording a striking example of the necessity of planting only the most suitable species for a locality. The soil and country at Rochefort is similar in many respects to the Cotswolds, and these woods formed a most instructive object lesson for the members of the Society interested in that district. The total area of the Communal Woods at Rochefort is 1,875 acres, 500 being broad-leaved species coppice with standards (managed on a twenty-four year rotation), the remainder conifers.

The Domain of Mirwart, which was visited on the third day of the tour, was bought in 1891 by Mr. J. P. von der Beeke, of Antwerp, and Dr. Schlich, F.R.S. In 1903 the latter sold his share of the property, but he still continues to control the management of the woods. This estate was one of the most interesting that was visited during the tour, because until 1891 the 2,875 acres of woodland, which had formerly been managed on the coppice with standards system, had of recent years been treated in a haphazard manner, and it emphasised the improvement which can be economically effected in a short time under capable supervision. The crop was formerly irregular, consisting chiefly of oak and beech, with a certain amount of hornbeam, aspen, ash, sycamore, and birch; but, owing to the lack of supervision, the original system of coppice with standards divided itself naturally into three divisions: (1) pure underwood; (2) highwood; (3) coppice. The first division consisted of very old stools producing extremely feeble shoots, whilst the majority of the woods were extremely thinly stocked. A large proportion of the trees were very inferior, owing to the best having been cut out and the worst left, a system which is entirely opposed to the best silvicultural principles; the growth was extremely small, and the underwood comparatively worthless. A large number of our British woodlands are practically in exactly the same condition, and it is interesting to note the measures adopted to improve this estate in order that we may endeavour to apply a similar system to our own woods.

1. All good stems unless *absolutely* mature were reserved and all inferior trees were removed.

2. Depleted areas were planted up with a quick-growing variety which would yield an early return.

The conditions of soil and height above sea-level and the attacks of game restricted the choice of species on one portion of the estate to the following varieties: larch, Scotch pine, Weymouth pine, or spruce, any of which will sell at an early age for pit-wood. Larch was unable to be utilised owing to the prevalence of larch disease (*Peziza Wilkomii*), and, the quality of the wood of the Weymouth pine being of an inferior nature, the choice of the ruling species was reduced to Scotch pine or spruce. The former yields better timber for pit-wood than the latter, but it is more subject to attacks from insect pests and to damage from snow, whilst spruce also yields a larger amount of timber and does not fall off in vigour after attaining the age of forty, as Scotch pine invariably does in this locality. This latter consideration was one of great importance in this case, as should the demand for pit timber become less, spruce will yield timber large enough for sawmill butts, whilst Scotch pine would not. In consequence, spruce was decided on as the ruling species with Scotch and Weymouth pine on a smaller scale in some places. From 1892-1902 some 2,000 acres were treated in the manner described above; the material was sold, felled, and realised £32,000 net, the area being replanted at a cost of £3,500, tending and replanting costing another £500, a total expenditure of about £2 an acre

Biolin, the first division of woodlands visited on the estate, has an area of about 276 acres, and is sub-divided into seven compartments. On a portion of this division excellent examples of the natural regeneration of beech occur. These are carefully preserved, and spruce are planted where necessary, so that the mixture is mainly composed of these species. The land stands at an elevation of 1,300 feet above sea-level, and it is worthy of note that deer on this property do considerable injury to several species, but the spruce is comparatively immune from their attack. In all cases where new exotics have been introduced the deer attack them with avidity. On a second portion of this division a bad coppice cut in 1899 was noted; the reserves of oak and birch were left, and Scotch pine was regenerating itself freely. In another compartment of this division there are some 40 acres of Scotch pine, planted 1873-1878, 8 lbs. of seed being sown per acre after cultivation. The trees are 48 feet high and average 18 inches in girth. The area has been thinned five times since 1891, and it is anticipated that the remainder will be sold in 1913. When this wood is cut the natural reserves of beech will be left and the spaces filled up with spruce.

Bois de Smuid, another division of woods on the property, has an area of about 480 acres, and contains a greater proportion of highwood than any other compartment. It contains some magnificent pure beech woods, the trees averaging 18 inches quarter girth and 48 feet high, or 108 cubic feet per tree (without making a deduction for bark). This wood also contains a certain amount of oak, but prior to Dr. Schlich's management these were greatly reduced in number; and as the soil is admirably adapted for their growth, the following plan has been adopted to increase their number:—Badly-stocked groups have been cut out, whilst those containing a larger growing stock have been allowed to remain, seedling oaks of one or two years being planted at the rate of 8,000 per acre on the better soil, and spruce, 2,400 to the acre, on soil of inferior quality. When the oak becomes thoroughly established the beech will be naturally regenerated. In this way the woods will consist of oak on the good soil, beech on soil of medium quality, and spruce on the inferior. Some exceptionally fine plantations of spruce were seen in the division of Les Loches. The trees, which were three years old when planted in 1893, have now attained a height of 12-16 feet and give every promise of maturing into magnificent woods in the future. On one portion of this estate the underwood is utilised as a nurse and cut back where necessary with dented teeth. A private owner near the above estate planted land which had a rental value of 12s. per acre with spruce and sold it for pit timber at thirty-two years for £32 per acre; the land at the time of planting received a dressing of 8 cwt. of kainite. After cutting the timber the land is let for £1 an acre for two years and field crops grown on it, after which it is again planted. This custom is fairly general in this district.

The system which was chiefly adopted in this district was coppice

with standards, the latter consisting of beech, oak, maple, and sycamore, the underwood being hornbeam. It has been found that this system does not produce timber of high quality, so it is intended to convert these woods into highwood, and to attain this object all beech and hornbeam standards are reserved. Underwood has been grown on a twenty-five years' rotation, and is readily sold for fencing purposes. Sycamore and maple sell more readily than beech, and are chiefly utilised for the manufacture of churns, whilst there is a good demand for birch for shoes. On the higher land Scotch pine woods are being established by sowing broadcast in March, but as the broom grows profusely it has to be cut back for two successive years in July before sowing, and by this means the pine is allowed to make headway; basic slag is sown broadcast to stimulate the plants in their early stages, but not on land containing heather, as immediately this fertiliser is sown on heath land the broom comes up in abundance. On the high land Scotch pine is preferred to spruce, as the land can be replanted immediately with beech; but where spruce is grown two field crops must be taken to clear the land of broom, which comes up freely after it is felled, whilst it does not do so with the pine.

The fourth day was devoted to visiting the Domain du Chenoy, the property of M. Boël, who kindly permitted the Society to visit his woods. The variety and succession of soils on this estate are particularly marked, and for this reason the woods contain a large number of varieties of timber trees, and the composition of the crops is extremely varied. Broad-leaved trees grow luxuriantly on the loamy slopes facing north and east, whilst conifers predominate on the sandy slopes of the south and west. This estate affords a most striking example of the effect of soil and aspect on forest growth. The estate may be said to be divided into three divisions, each possessing its own system: coppice with standards, underwood and coniferous woods on the poor sandy soils. An excellent plantation of Scotch pine was noticed, which appeared to be doing extremely well (this is the only variety of conifer which will thrive in this district and keep down the heather). The heather is first removed and strips hoed up 3 feet 3 inches apart. These strips are 1 foot wide and 1 foot deep. On these 4 cwt. of slag is sown in autumn and 8,000 plants per acre are planted the following spring (the reason for planting so thickly is on account of the large numbers which are destroyed by rabbits and game).

Where the soil is extremely poor two crops of lucerne are taken before planting in order to make it moister and less liable to be impoverished by the removal of nutritious salts; the lucerne is followed by a crop of oats or rye, and sometimes by a second crop of lucerne, followed by another cereal crop. All Scotch pine plantations on this estate are clear cut and the roots extracted and used for firewood, as by this method the land does not have to lie idle for three to four years, in order to prevent the pine weevil attacking the young plantations, but can be planted forthwith. It is considered in Belgium that in cases where land has not a higher rental than 16s. per acre it is more

profitable to plant it, especially as the Belgians consider it probable that a timber famine will occur in the near future, which must cause the price of wood to rise considerably.

COPPICE WITH STANDARDS.

The most striking feature of the woods in which this system is adopted was the magnificent growth of the standards in them ; there are a quantity of magnificent beech with boles of 50-60 feet long, the measurements of one particularly fine specimen being as follows : height, 57 feet ; quarter girth 5 feet from the ground, 30 inches (average quarter girth 27 inches), and containing 250 feet of timber worth 2s. a foot, or £25. The oaks were extremely fine, one of the best seen being 50 feet high with a quarter girth of $24\frac{3}{4}$ inches at 5 feet from the ground, and containing 150 cubic feet of timber ; whilst Picardy poplars averaging 72 feet in height were noticed, and also large sycamores and ash. Beech standards, however, predominate, and have killed a large portion of the underwood by their shade, and for this reason this tree should never be selected as a standard where underwood is grown beneath it, oak and ash being far more suitable for this purpose. In the young plantations pruning is a necessity in order to obtain boles of 40-50 feet, owing to the rotation of the underwood only being fifteen years, but with a rotation of twenty-five years it is seldom necessary to prune. The underwood is cut a year before the standards, as by adopting this method they can be examined better by the purchaser and realise a higher price, the only disadvantage being that the young coppice shoots get injured in removing the timber.

The last day of the tour was devoted to visiting the forest of Soignes, which is situated in the vicinity of Brussels. The altitude of the forest is 290-420 feet above sea-level, whilst the soil is fairly deep loam and admirably adapted to the growth of high-class timber. The area of the forest is 10,210 acres, of which 8,750 acres are beech woods, the remainder being devoted to the growth of conifers and coppice with standards. The beech woods are magnificent, the trees on some of the finest sections averaging 100 cubic feet per tree for 143 years' growth. Until 1886 the system of management adopted in these woods was to grow beech on 100 years' rotation and then clear cut (leaving four to twelve standards per acre), followed by artificial planting ; under the new system, however, the rotation has been raised to 160 years and the selection system adopted, thinnings being made every eight years. The coniferous woods are grown on a forty years' rotation, whilst the rotation of the underwood varies from ten to fifteen years, according to circumstances. The revenue obtained amounts to £18,000 per annum, or approximately £1 11s. 6d. per acre. It was noticed that whenever larch and beech were growing together the former species appeared healthy and were growing strongly, but in places where larch was grown pure the growth was decidedly inferior and the trees in many cases were diseased. The work of the day was

concluded by visiting the Arboretum, which was established in 1897, and which has an area of about 24 acres subdivided into plots of 30 feet square, which is the space allotted to each species. On plots carrying light-demanding species the interspaces are filled up by planting shade-bearing shrubs and plants. It is usually recognised in Great Britain that the Pacific Douglas is liable to damage by autumn frost, whilst the Colorado variety is immune from it; but in this Arboretum the Colorado variety suffers from early frost and the Pacific Douglas does not.

Amongst a large number of species of interest were noticed *Abies Numidica* (the only silver fir of Africa); *Abies Webbiana* (highlands of India); *Abies Pinpra* (the lowlands of India); *Abies Cilica* (the silver fir of Asia Minor); *Abies Cephalonica* (the Grecian silver fir); *Pinus Banksiana* (a member of the pine genus which makes three or four shoots a year and is especially suitable for poor dry lands); *Picea Omorica* (the hardiest species of spruce); *Fraxinus Alba* (the white ash); and numerous others.

The above examples show clearly that the Belgians have succeeded in making forestry pay, and it is an indisputable fact that British woodlands are capable of yielding far higher returns than they do at the present time if they receive capable supervision. The chief reasons for the low returns yielded by our woods in the past are as follows:—

1. Woods have in many cases not been grown on the most profitable rotations, being frequently felled before they were mature, or allowed to stand for a considerable period after attaining maturity, when they should have been felled and the land replanted with a fresh crop.

2. By planting species of the highest financial value, *without ascertaining whether they were suitable for the soils and situations on which they were planted (especially larch)*.

3. By continuing to grow underwood, which in many districts is almost unsaleable, instead of converting it into highwood.

4. By only growing half instead of a full crop, and not dealing with depleted areas.

By insisting on the following points, landowners would increase the annual incomes derived from their woods, and in addition considerably enhance the capital value of their estates.

1. By keeping woods *fully* stocked from the time they are planted until the final felling takes place.

2. By seeing that the thinnings and final fellings are made at the correct periods.

3. By gradually converting unprofitable underwood into highwood.

A COUNTRY RENT AUDIT.

A few years ago, through the sudden illness of an agent, I found myself called upon to preside at my father's rent audit, and as similar experiences will fall to the lot of many readers of the *Gazette* a short account of the proceedings may be not entirely devoid of interest. As

I had never been present at an audit I did not feel very confident of success. The rents had to be collected from the farmers on two estates, and I knew very little of the tenants on the more distant property. Moreover the farms are on the Welsh border, and dwellers on the borderland are naturally touchy because the members of either nation so often have their feelings injured by their neighbours of the other race.

At eleven o'clock on the appointed day I sat in a private room of the King's Hotel in the county town. After I had read most of the news in the *Standard* twice over my first visitor arrived—a cottager's wife, who paid her trifle of rent and departed to get what return she could in the shape of bread-and-cheese and beer. Others followed in rapid succession, and left with a similar purpose. Then the principal tenants began to arrive. Most of them asked for allowances for one thing and another, as though it were a necessary part of the business. They seemed quite satisfied if I promised "to mention the matter" to my father, and it transpired that many of their grievances were hardy perennials, which would only have to be replaced if removed. "Farmer" Roberts carries his eighty years as easily as you carry your walking stick: while I wrote out his receipt he repeated over and over again "The Squire is that good to me! The Squire is that good! He'll always do anything for the askin' of it! *Oh*, he's that good to me—and always has been!" As I gave him the receipt he looked fixedly at me for a moment, and then he said, with a deep sigh, "*Oh*, the squire's that good to me!"—(another sigh)—"He've done nothing for me for years!" I laughed, but the old man blinked at me and said coaxingly, "Now don't you think as he'd put me up a bit of a wainus? He *is* that good!" "What sort of thing is it you want?" I asked, utterly in the dark. "Oh, just a little bit of a wainus, a very little bit," and then he added by way of translation, "just to keep me trap out of the wet."

Payments were made in many forms. Cheques previously received by the tenants themselves seemed to be the favourite means employed, while the amounts were made up to the proper sum with bank notes and cash. The counting of the notes and the calculations to find the totals of these mixed payments did not form a pleasant task, for the tenants, especially those of the one nationality, seemed to regard it as a questioning of their honesty. This it most certainly was not, but their repeated assurances that the rent was all there made me feel a veritable Shylock.

Presently one of the Welsh farmers arrived, whom I did not know. He paid his rent with much grumbling, and sullenly demanded various allowances. When I said I hoped to see him at dinner he launched forth into a stream of abuse of the audit dinners; he said he knew that my father paid for good dinners, but that the hotel people were dishonest, but the landlord of the inn at T—— (near his own farm) would provide a far better dinner. "Well," I said, "I shall be at the dinner myself to-day, so I shall see what is the matter; I hope I shall

see you at two o'clock." "Oh," he replied, "if you don't begin dinner till two there won't be time. The train for T—— leaves at six, so I *can't* come. Good day!" I began to wonder if I could possibly survive a four hours' dinner!

When I went to the dining room all the guests had arrived. The table was an unusually long one, and, with the old-fashioned love of symmetrical arrangement which survives to such a large extent among servants, chairs had been arranged all the way round it, though a third of the number would have been sufficient. The farmers scattered themselves in such a way that two or three empty chairs frequently separated one man from his neighbour, and this arrangement had a desolate appearance and a depressing effect. When I suggested that we should all sit together, my proposal was evidently unwelcome, so it seemed wiser to make the best of things as they were.

The dinner itself was an excellent one: we had soup, followed by two kinds of fish, fowls roasted and boiled, roast beef, puddings hot and cold, and cheese, and each man drank anything he cared to ask for. Old John Price, on my immediate left, kept up a continual murmur of disapproval of everything connected with his farm, in fact he criticised the management of everything connected with the estate, from the Hall itself to the gamekeeper. Knowing that he and my father were on the best of terms, I took his grumbling to be a sign of contentment, and such I believe it was. On my right sat Edwin Thomas, a very shy young man from Wales. He had been in great trouble with the local M.F.H., owing to some dark dealings with regard to a litter of cubs. The man just beyond him was a very superior person called Strange, who had been educated at a boarding school. Strange amused himself by tormenting the nervous Thomas, cross-questioning him continually about the foxes on his farm. Thomas evidently expected that the whole story of his misdeeds would be brought to light, but Strange, being a hunting man, thought, no doubt, that he was inflicting a well-merited punishment upon him. I tried to turn their conversation to a safer topic, but John Price took up most of my attention. This venerable gentleman had already consumed four whiskey-and-sodas, and when the fifth arrived "the row began." He said that the whiskey was Irish, and unfit to drink. The waitress assured him it was Scotch, but this he denied indignantly. She declared that it was the same whiskey that he had been drinking before, but he insisted that it was Irish. I told him to have a fresh glass. No, he would *try* to drink it; but the first sip was followed by horrible grimaces and groans, and renewed protestations against Irish whiskey. Then I suggested that he should drink this concoction first, and have a real Scotch afterwards. This solution of the difficulty seemed eminently satisfactory; the much-maligned drink was finished without a murmur, and the evil taste was drowned in the "genuine article" which followed.

And now the cloth was removed, and steaming hot punch was discussed in a dense atmosphere of cigar smoke. Mr. Price proposed the health of the squire and family, in a speech which would have been

embarrassing if it had been made before dinner. He dwelt on the fact that in the old days landlords dined with their tenants at rent audits, but that now they were too proud to do so; there had been a time when anything could be had by asking the landlord, but now the whole estate was going to the dogs. He hoped that when my turn came things would improve. It was not exactly an easy matter to return thanks for a toast so curiously given.

As the smoke grew thicker and the punch bowl emptier the farmers became more sociable; the principal amusement consisted in chaffing old farmer Roberts, the old gentleman who wanted a "wainus," but he was always capable of turning jokes against their makers. It was in vain that I tried to persuade the old man to give us a song, but a younger tenant treated us to a ballad dealing with "home-brewed and brown bread"; the moral of the song was that if a man did not keep out of the squire's clutches he would go short of these commodities. An old farmer assured me that it was the first song that had been sung at the rent-audit for more than thirty years, so I felt pleased with the innovation in spite of the doubtful light cast upon persons of my father's calling.

The proceedings ended at about half-past five, and I never enjoyed a four-mile walk more than I did on that evening. Two omissions of which I had been guilty my father can never forget; I had not proposed the health of the Queen and I had not said grace.

A. BIRD.

PECAN NUTS.

We published a note on these edible nuts in this volume, Part 2, pp. 58, 59, December, 1904. From the Year Book of the United States Department of Agriculture, 1904, we abstract the following, from a paper on Promising New Fruits, by William A. Taylor, Pomologist of the Bureau of Plant Industry.

Of our native nut-bearing trees none promises to become of such pomological importance as the Pecan. Within the region for which it is well adapted for cultivation, which may be roughly stated as the Mississippi Valley, below St. Louis, the South Atlantic and the Gulf States, including Texas, no other nut tree, either foreign or introduced, can be considered as fairly in competition with it. Though long neglected as a possible profitable orchard tree, it has, during the past fifteen years, assumed considerable importance, and extensive orchards have been planted in most of the Southern States. Previous to 1900 most orchards were planted with seedling trees or with nuts of particular varieties, which were placed at desired distances and allowed to germinate and grow where the future trees were to stand, thus avoiding transplanting. But it has become increasingly apparent that the seedlings from trees of exceptionally fine varieties vary too greatly from their parent types to be satisfactory. Such seedlings rarely bear nuts closely similar to the parent in size, form, colour, thinness

of shell, plumpness of kernel, or dessert quality, and still more rarely do they reproduce the desired productiveness, ripening time, or other important characteristics that determine the commercial value of the tree. The necessity of relying on budded or grafted Pecan trees for commercial orchards is now very generally recognised by intelligent planters, so that at the present time very few seedlings are being planted.

A good deal of confusion exists among growers as to the exact identity and proper nomenclature of the different leading sorts. The National Nut Growers' Association and the American Pomological Society are endeavouring to remedy this. The author illustrates the ten sorts which have been propagated a sufficient time to obtain a wide distribution among planters. The illustrations represent characteristic specimens of the varieties and show the thickness of skin, the form, colour, and plumpness of kernel as well as the external appearance. The varieties figured are the Centennial Pecan, Louisiana; average nuts 45 to 50 to the pound, shell rather thick; kernel plump and solid; of delicate texture and flavour, quality very good. Frotscher Pecan, Louisiana; 45 to 50 nuts to the pound, shell thin to very thin; flavour pleasant, quality medium. Jerrett Pecan, Mississippi; 45 to 55 nuts to the pound, shell rather thick; kernel rather coarse in texture and only fairly good in quality. Pabst Pecan, Mississippi; 45 to 55 nuts per pound, shell thick and hard; kernel plump, fine texture, delicate flavour, very good quality. Post Pecan, Texas; 65 to 75 nuts to the pound; shell thick; kernel clear, fine texture, delicate flavour, quality good. Rome Pecan, Louisiana; 40 to 55 nuts to the pound; shell thick and hard; kernel often shrunken, coarse and dry, and usually indifferent quality. Russell Pecan, Mississippi; 55 to 60 nuts to the pound; shell very thin, kernel sometimes lacking in plumpness, flavour pleasant, quality good. San Saba Pecan; 85 to 90 nuts per pound; shell very thin and brittle; kernel plump, delicate and fine grained texture, flavour very delicate, quality the best. Stuart Pecan, Alabama; 40 to 50 nuts to the pound; shell moderately thin; kernel bright and plump; texture firm, flavour delicate and rich, quality very good. Van Deman Pecan, Louisiana; 45 to 55 nuts per pound; shell moderately thin; kernel long and generally plump, flavour delicate and rich, quality very good. Now that these nuts are receiving more attention in the United States it is very likely that they will be found more frequently in the English markets.

AGRICULTURAL DEVELOPMENT IN ARGENTINA.

NOTES FROM A PAPER BY FRANK W. BICKNELL IN THE UNITED STATES YEAR BOOK OF THE DEPARTMENT OF AGRICULTURE, 1904.

The Argentine Republic has a total area of 1,135,840 square miles; about 25 million acres are in cultivation, nearly half of this in wheat. Argentina, with the wheat she raises, can supply bread not only for her own 5 million people but for about 20 million people in other

countries. The country extends through 34 degrees of latitude, or about 2,300 miles from north to south, it is 800 miles wide at its widest place. Nearly everything that has been done in Argentina so far is experimental. Years ago most of the valuable land was parcelled out in large tracts and either given away or sold for a trifle. The small farmer was not encouraged, and large owners of land were satisfied with a small revenue per acre, because they had so much. The immigrants, mostly from Italy, were ignorant of agriculture and did not wish to learn. Now the influence of English and North American ideas is felt, and most of the leading estancieros are very ambitious to make the best use of their great opportunities. They are not only improving their stock but making better use of their land. The climatic advantages of the land are very great, there is no winter to contend with.

More than fifty years ago Leonardo Pereyra began to import Shorthorns from England and three quarters of the cattle (over 25,000,000) in the country have Shorthorn blood. Argentine cattle and sheep are not admitted alive to English ports on account of foot-and-mouth disease existing there. Argentina is now the best market English breeders have for their pure-bred stock. During the past year many Shorthorn bulls have been sold in Buenos Ayres at prices ranging from £400 to £2,600 ; and at least fifty at prices above £1,000. The value of live stock imported into Argentina in 1903 was £140,000 ; in 1904 it was much larger. The Argentina cattleman has learnt not only the importance of producing a well-bred steer rather than a "scrub," but also the importance of corn-feeding, especially if the beast has to be shipped alive.

The frozen-meat trade is the most important ; in 1903, 3,381,600 frozen carcasses of mutton and 996,023 quarters of beef were exported, nearly all to England. Five freezing plants are at work near Buenos Ayres.

The dairy industry is developing ; in 1903, 6,875 tons of butter were exported at an average price of just under 9d. a pound : the amount is quickly increasing. The introduction of lucerne (alfalfa) has redeemed hundreds of thousands of acres and increased its carrying capacity five, ten, and even fifteen times : and caused the development of vast areas of hitherto waste land. Some of the rich pastures of Buenos Ayres will carry a bullock to every two acres.

The total wheat export for 1903 was 75 million bushels, for the first nine months of 1904 it was 100 million bushels. The area under wheat is over 9 million acres, the average produce probably between 13 and 14 bushels per acre ; though in Buenos Ayres Province it is much more than this. It is winter wheat, rather hard, very heavy, 60 to 64 lbs. per bushel, and with a very high percentage of gluten. Facilities for marketing grain are improving. In future the Argentine farmer will raise more Indian corn on which to feed his live stock, and in a few years a considerable amount of pork will be produced.

Over 23 million bushels of linseed were exported in 1903, and the

cultivation of this will increase. Fruits, cotton, and tobacco are products of which we are sure to hear more in the future.

Agricultural land is rising rapidly in value, but may still be had from £2 to £3 an acre where 200 or 300 miles from seaboard and 6 or 8 miles from a railway. Rent varies from 3s. to 16s. an acre, mainly with accessibility to market. The country is no place for a poor man, and the man of small capital has comparatively little chance. Great opportunities exist for profitable investment in the development of the resources of the country, but the greatest prudence must be exercised and care taken to know in advance how to avoid the difficulties that beset a stranger in a strange land.

Our author does not mention locusts.

R.A.C. LITERARY AND DEBATING SOCIETY'S DRAMATIC ENTERTAINMENT.

The annual theatricals, under the auspices of the College Literary and Debating Society, took place on Tuesday, December 5th, and were quite up to the standard of recent years. The entertainment was largely attended in spite of the most unfavourable weather conditions.

The play chosen for presentation was the short farce from "Vice Versâ," by F. Anstey, the cast being as follows :—

"VICE VERSÂ."

A LESSON FOR FATHERS.

Dramatised from the Story by F. Anstey.

In Two Acts.

Dramatis Personæ.

Dick Bultitude's Body (inhabited first by Dick Bultitude's Spirit ; afterwards by Mr. Bultitude's)	Mr. P. J. MURRAY
Mr. Bultitude's Body (inhabited first by Mr. Bultitude's Spirit ; afterwards by Dick's) ...	Mr. H. T. BULLOCK
Dr. Grimstone (of Crichton House, Rodwell Regis)	Mr. G. LYON
Mr. Shellack (Merchant of Canton)	Mr. H. F. DONALDSON
Clegg (a Cabman)	Mr. A. M. HENNIKER
Tipping } (Schoolboys)	Mr. C. B. JOYNSON
Chawner }	Mr. H. S. VERNON
Coggs, &c. }	Mr. V. MACNAMARA
Dulcie (Dr. Grimstone's Daughter)	Mr. E. V. COPE
Eliza (Mr. Bultitude's Housemaid)	Mr. A. H. CHELL

Act 1. Scene—Mr. Bultitude's Dining Room.

Act 2. Scene—The Schoolroom at Crichton House.

The chief credit for the success of the evening belongs to Mr. P. J. Murray, who not only effectively performed the duties of stage manager but also played the leading role of Dick Bultitude in a highly efficient manner. His acting throughout was admirable, attaining brilliancy after transformation into Paul Bultitude when he wishes to get rid of the attentions of Dulcie.

Mr. H. T. Bullock, as Mr. Paul Bultitude, was very good, but we think his conception of the part was at variance with the author's intention when he arrives at school in a hopeless state of intoxication, to see how his son enjoys Crichton House. The inherent difficulties of the transformation were much too difficult to be successfully undertaken by amateurs, and in consequence many of the audience were somewhat befogged as to the effects of the Garuda Stone.

Mr. G. Lyon, as the dominie, was somewhat lacking in dignity, but gave a fair rendering of the part; Mr. Donaldson, as Shellack, was worthy of the highest praise; and Mr. Henniker, as the cabman, made us regret that his part was not more extensive, as he rendered the small part quite attractive.

The Schoolboys were all good, being extremely natural, and Mr. Vernon in particular in the part of Chawner was deserving of special commendation.

The ladies would not inadequately be described as weaker vessels, as Eliza with a robust baritone voice was far from convincingly feminine; whilst Dulcie, although of very handsome appearance and reflecting great credit upon Mr. Knowlson, was lacking in charm, a feminine characteristic which we have not always looked for in vain.

The scenery was up to the high standard maintained by Prof. Paton in previous years; the duties of prompter were efficiently and not too obtrusively performed by Mr. C. Kearton, whilst valuable assistance was rendered as stage carpenters by Messrs. Akers, Pero, Moron, Burra, Snowball, and Taylor.

As the play was somewhat short, a brief concert preceded the performance, Mr. T. Craven being first heard to advantage in "Capricante" (*Paul Wachs*), and later in "Sea Piece" (*MacDowell*); the vocalists being Mr. C. D. Trier and Miss Wood, the former singing "Awake" (*Pelissier*), and the latter, though feeling very unwell, came very pluckily upon the stage and gave a finished rendering of the "Love Song of Har Dyal," but was unable to respond to an emphatic encore. Miss Ellett discharged efficiently the duties of accompanist in the latter case.

At the close of the proceedings Mrs. McClellan and the Principal entertained the performers and guests in their customary hospitable style.

R.A.C. STEEPLECHASE.

This annual event was run on Friday, December 1st, on the College Farm, over a stiffish course of about two-and-a-half miles. There were five starters. Gater took the lead as soon as the flag was lowered, and made the running throughout, winning easily by a distance. Mathias came in second, Chell third. Donaldson finished fourth. Gater was only once challenged: this was just before crossing the Tetbury road, but Mathias was unable to keep his place, and dropped back again beaten. Mr. Bruce Swanwick kindly acted as umpire.

COLLEGE NOTES

POULTRY AND POULTRY FARMING.—Beginning with the present Term a Two Years' Course of Lectures and Demonstrations will be included in the curriculum, and will cover the whole field of scientific poultry farming. The classes will be held once a week, viz., on Thursdays at 3.45 p.m., and will be open to the whole College. Attendance will be voluntary, and there will be no examination excepting a voluntary one for Certificates at the end of the Course. Students, when qualified and approved, may in turn be appointed to take charge of fowls, or of incubators and foster-mothers, under supervision. Mr. Cecil L. Byrne is appointed lecturer and demonstrator.

THE DAIRY. POST-GRADUATE DAIRY CLASSES. (No Fees).—After the commencement of next year Students who have taken the Diploma will have the option of attending, without payment of any fee, a series of Vacation Dairy Classes, as follows, viz. :—In the Spring Vacation, daily, Saturdays excepted, for three weeks; in the Summer Vacation, daily, Saturdays excepted, for four weeks; as may be arranged by the Principal. Students attending will be expected to undertake all the manual operations of butter and cheese making, &c., under supervision, and to qualify for obtaining by examination a Special Certificate of the College in Dairying. They will lodge and board in the town at their own charges; and, excepting for the said purposes, the College premises will not be open to them during the Vacations.

OLD STUDENTS.

Mr. J. W. Pitt Muir Mackenzie, M.R.A.C. (1887), Member of the Council of the Governor of Bombay, has accepted the position of Corresponding Member of the College, in succession to the late Mr. E. C. Ozanne, C.B., M.R.A.C.

The Earl of Crewe (R.A.C. 1888), formerly—1892 to 1895—Lord Lieutenant of Ireland, is Lord President of Council in the new Ministry.

DIPLOMA.

The following gentlemen obtained the Diploma of Membership last term: Mr. Eric C. Barker and Mr. Alan Peter Slingsby; the external examiners being, in Agriculture Mr. C. B. Davies, Dr. J. A. Voelcker in Agricultural Chemistry, Prof. H. Robinson, M.I.C.E., in Surveying and Engineering, and Prof. Sir George Brown in Veterinary and Bacteriology.

SCHOLARSHIPS.

The First Scholarship was won by Albert Sasson, and the Second and Third divided between M. P. Knubley and R. H. Price; L. B. Akers being *proxime accessit*.

OBITUARY.

We regret to record the death of Colonel Charles Lucas Methuen, M.R.A.C. (1886), Holland Gold Medallist, at Clifton, on August 17th. For many years Colonel Methuen commanded the Gloucestershire Volunteer Battalion. Æt. 62.

CHLORINE IN RAIN WATER.

The rainfall for the six months ending September 30th last, was 13.44 inches, falling on 83 days: it contained a mean of chlorides equivalent to 277 grains sodium chloride per gallon, *i.e.*, equal to a deposit of 11.96 lbs. of common salt per acre.

The rainfall for the twelve months ending the same date was 23.66 inches, on 172 days, and it contained chlorides equal to 26.8 lbs. of common salt per acre. E. K.

R.A.C. BEAGLES.

These hounds have up to date hunted sixteen days, and have accounted for five hares. During October the scent was very bad owing to the dry condition of the ground, but sport has been very good since the rain.

On November 4th, hounds ran for 50 minutes, and turned their hare over in the open.

November 8th, hounds met at Poulton Priory, and had two excellent runs, and had very hard luck in not killing their hares.

November 15th, hounds met at Maisey Hampton, and had a very pretty hunt—1 hour and 25 minutes. Mr. Hobbs's usual hospitality was very much appreciated.

November 29th, hounds met at Woodmancote, and had what may be called a record run. Hounds ran a four-mile point, and it could not have been less than seven as hounds ran. They had to be whipped off, as the hare got into the Park close to Duntisbourne.

December 9th, hounds met at Syde, and had a most beautiful gallery hunt, killing their hare after 1 hour and 10 minutes.

These are a few instances of good days enjoyed by followers of the College beagles. Mr. Burra and his staff are to be congratulated on the wonderful handy little pack. The whippers-in are Messrs. Smyth, Akers, Cope, and Slingsby. All the members of this College wish Mr. Burra every success in the future, and congratulate him on the tactful way he manages the farmers.

FOOTBALL.
ASSOCIATION.

R.A.C. v. CIRENCESTER UNITED BANKS.—Played on the Banks' ground on Thursday, November 2nd, and resulted in a win for the College by 3 goals to 1. The College defence was very sound, Beardsley, Lyon, and Chell being most

prominent, and of the forwards, Bullock and Cope on the left wing did very good work. The College team was as follows: Goal, H. Beardsley; backs, G. M. Dobson and G. Lyon; half-backs, A. Rheinganz, A. H. Chell, P. J. Murray; forwards, H. Donaldson, T. Smith, G. Kearton, T. H. Bullock, E. Cope.

R.A.C. v. CIRENCESTER GRAMMAR SCHOOL.—Played on the School ground on Wednesday, November 22nd. The first half of this match was very slow and scrappy. The School scored first, owing to a misunderstanding in the College defence, but at the kick off again the College ran straight through and scored. At half-time the visitors were leading by 2 goals to 1. On resuming play the game became faster and more exciting, and there were several good left wing rushes, and finally the College put on two more goals, thus winning by 4 goals to 1. Of the defence Pero and Dobson were most prominent, and in the forward line Bullock, Archer, and Knubley were conspicuous for their good play. Bullock Donaldson, Smith, and Knubley scored for the College. The College team was as follows: Goal, B. Pero; backs, G. M. Dobson and G. Lyon; half-backs, A. Rheinganz, W. Osborn, E. Casada; forwards, M. P. Knubley, H. Donaldson, T. Smith, T. H. Bullock, H. de B. Archer.

R.A.C. v. CIRENCESTER TOWN THURSDAY.—Played on Thursday, December 7th, on the Park ground, and resulted in a pointless draw. The ground was very greasy, and there was a strong wind blowing down the ground. The College pressed hard in the first half, and several times looked like scoring. On crossing over, the defence had most work, but the Town XI. could not find the net. There were several good forward rushes, but the College were unable to score. The College defence was again very sound, and Beardsley played an excellent game in goal. The College team was as follows: Goal, H. Beardsley; backs, G. M. Dobson and G. Lyon; half-backs, A. Rheinganz, A. H. Chell, W. Osborn; forwards, M. P. Knubley, H. Donaldson, T. Smith, T. H. Bullock, P. J. Murray.

RUGBY.

R.A.C. v. BATH "A".—Played at Bath on October 21st, the home team winning by 36 points to nil. The R.A.C. went with only 13 of their proper team, as Cope and Longcroft were crocked up. The College played up well and kept the home team from scoring during the first twenty minutes, but the training of the Bath team soon told against the College team, which, nevertheless, stuck to it very well.

R.A.C. v. READING SCHOOL.—This match was played at Reading, October 28th, and resulted in a win for the College by 45 points to 3. The Reading School team were very much weaker than they were last year, but, nevertheless, they played a hard plucky game. The College played a good game, especially the three-quarters, who were seen to advantage in their passing. H. S. Mathews played half-back for the College. Tries were got by Mathews (2), W. Osborn (2), Gater (1), A. Osborn (2), Archer (1), Cope (1), Vernon (2), Murray (1), McDiarmid (1). Stevens, the Reading School captain, intercepted a pass and managed to score for the home team.

R.A.C. v. GLOUCESTER OLD BOYS.—This match was played at Gloucester on November 11th, and resulted in a win for the home team by 24 points to 8. The Old Boys had the best of the game in the first half, in which they scored 18 points. The College played up well the second half, and Knubley, after a good dribble, managed to score the first try for the College. McDiarmid failing to convert, the play after this was kept practically in mid field, the forwards doing some good work; but towards the close of the game Joynson intercepted a pass, and got clean away and scored the second try for the College, which Bullock easily converted.

R.A.C. v. BERKSHIRE WANDERERS.—This fixture was played at home on November 15th, the College winning by 10 points to nil. The College team did not play up as well as they should have done, taking things much too easily. Considering the weakness of the Wanderers the College should have got over many more times. Macnamara and Joynson scored tries for the College, both of

which were converted. The College forwards packed very badly in this match ; they should learn to keep their heads.

R.A.C. v. CHELTENHAM "A".—Played at Cirencester on November 25th. After a hard game the College won by 5 points to 3. The game was one of the best seen on the College ground for some time. In the early part of the game Macnamara put in some good tackling, and about ten minutes from the start W. Osborne almost scored. A few minutes afterwards Murray should have scored, having obtained possession from a line-out. He had a clear field and was close to the line, but was tackled from behind. McDiarmid tried a penalty kick, but failed to score. Good work by Joynson resulted in Trier getting over and scoring behind the posts, McDiarmid easily converting. Vernon made a good opening, but a certain score was lost by his failing to pass to Joynson. Cheltenham had much of the play after this, the College being hard pressed on their own line. After a scramble on the College line one of the Cheltenham forwards scored a try which was not converted. Towards the close of play Bullock made a splendid opening, but, by failing to pass to Joynson, once again a certain score was lost. Gater played a strong forward game, and Bullock and Macnamara showed up well at half-back.

BILLIARDS.

An American Handicap Tournament, 200 up, was played off during the session between the following competitors :—

Prof. Paton ...	... ser.	W. F. Mott ...	35	R. C. Samazeuilh ..	65
Prof. Locke ...	... 10	A. Rheinganz ...	50	E. V. Cope ...	75
Prof. West ...	... 10	H. A. Smith ...	50	K. Landau ...	80
G. Lyon ..	... 20	B. Roa ...	50	Prof. Duncan ...	100
J. Poore ..	... 20	J. Galvez ...	60	A. N. Burra ...	100
C. Kearton ...	... 20	F. J. W. Taylor ...	60	A. Greis ...	100
H. Bernal ...	... 20	T. Hinds ...	60		

The prizes went to—1, G. Lyon ; 2, E. V. Cope ; 3, F. J. W. Taylor.

CRICKET, 1905.

BOWLING AVERAGES.

	Wickets.	Overs.	Maidens.	Average.
G. Lyon	53 ...	183·4 ...	31 ...	12·4
E. Hopton	19 ...	62·3 ...	2 ...	15·6
K. McDiarmid	19 ...	83·5 ...	3 ...	19·5
J. Poore	5 ...	20 ...	0 ...	20·0
E. Longcroft	3 ...	15 ...	0 ...	27·0
H. Vernon	22 ...	143·4 ...	17 ...	27·5

BATTING AVERAGES.

	No. of Innings.	Times not out.	Most in an Innings.	Total.	Average.
W. Osborn	12 ...	0 ...	89 ...	210 ...	17·5
G. Lyon	12 ...	1 ...	37 ...	189 ...	17·18
E. Longcroft	7 ...	0 ...	32 ...	106 ...	15·14
H. Bullock	11 ...	0 ...	49 ...	149 ...	13·54
J. Poore	12 ...	1 ...	39 ...	138 ...	12·5
A. Osborn	3 ...	1 ...	24 ...	24 ...	12
H. Vernon	11 ...	0 ...	54 ...	121 ...	11·0
H. de B. Archer	6 ...	2 ...	17 ...	34 ...	8·5
C. Kearton	10 ...	1 ...	20 ...	54 ...	6·75
K. McDiarmid	12 ...	1 ...	32 ...	74 ...	6·72
E. Hopton	12 ...	1 ...	14 ...	45 ...	4·09
T. Hinds	3 ...	1 ...	4 ...	6 ...	3·0
H. Beardsley	12 ...	2 ...	6 ...	26 ...	2·6
H. Taylor	4 ...	0 ...	3 ...	5 ...	1·25

GOLF.

On Saturday, November 4th, a match was played against the Sapperton Park Golf Club, on the College Links, and resulted in a win for the visitors by $6\frac{1}{2}$ to $4\frac{1}{2}$.

R.A.C.				SAPPERTON.			
Prof. Paton ...	..	..	0	C. O. H. Sewell ...	..	..	1
E. B. Haygarth ...	..	..	0	J. Rawlins ...	..	..	1
K. McDiarmid ...	..	..	$\frac{1}{2}$	E. C. Cripps ...	..	..	$\frac{1}{2}$
W. F. Mott ...	..	..	0	W. G. Tovey ...	..	..	1
Prof. Blundell ...	..	..	1	H. Boulton ...	..	..	0
G. Lyon ...	..	..	1	C. Allen ...	..	..	0
W. W. Dobson ...	..	..	0	A. Stradling ...	..	..	1
Prof. Locke ...	..	..	1	R. J. Mullings ...	..	..	0
M. de la Gandara ...	..	..	$\frac{1}{2}$	W. H. Cole ...	..	..	$\frac{1}{2}$
Prof. West ...	..	..	0	A. H. Gibbons ...	..	..	1
C. B. Joynson ...	..	..	$\frac{1}{2}$	Rev. T. F. Burra ...	..	..	$\frac{1}{2}$
<hr/>				<hr/>			
$4\frac{1}{2}$				$6\frac{1}{2}$			

On Tuesday, 7th November, a brake went over to Minchinhampton, where the Students played the Staff, which resulted in a win for the Students by 5 to 4.

STAFF.				SINGLES.		STUDENTS.				
Prof. Paton ...	...	...	..	0	K. McDiarmid	...	...	...	1
Prof. Locke ...	...	...	..	0	W. H. Mott ...	...	...	...	1
Prof. Blundell ...	...	...	...	1	C. B. Joynson	...	...	...	0
Prof. West ...	...	...	..	1	W. W. Dobson	...	...	...	0
Prof. McClellan ...	...	...	...	1	E. Henniker ...	..	...	...	0
Prof. Duncan...	...	...	...	1	A. Greis	...	..	...	0
FOURSOMES.										
Prof. Paton	}	0	K. McDiarmid	}	1
Prof. Locke						W. F. Mott				
Prof. Blundell	}	0	C. B. Joynson	}	1
Prof. West						W. W. Dobson				
Prof. McClellan	}	0	E. Henniker	}	1
Prof. Duncan						A. Greis				
				4					5	

A return match was played on the 18th November, v. Sapperton Park, away, and resulted in a win for the home team by $8\frac{1}{2}$ matches to $3\frac{1}{2}$.

R.A.C.				SAPPERTON.			
Prof. Paton ...	..	..	0	C. O. H. Sewell ...	..	..	1
E. B. Haygarth ...	..	..	0	J. Rawlins ...	..	..	1
K. McDiarmid ...	..	..	$\frac{1}{2}$	H. St. G. Rawlins ...	..	..	$\frac{1}{2}$
W. F. Mott ...	..	..	1	W. G. Tovey ...	..	..	0
G. Lyon ...	..	..	0	E. C. Cripps ...	..	..	1
Prof. Locke ...	..	..	$\frac{1}{2}$	E. C. Sewell ...	..	..	$\frac{1}{2}$
G. E. Cranstoun ...	..	..	$\frac{1}{2}$	A. H. Gibbons ...	..	..	$\frac{1}{2}$
W. W. Dobson ...	..	..	0	R. J. Mullings ...	..	..	1
M. de la Gandara ...	..	..	0	W. H. Cole ...	..	..	1
F. de la Gandara ...	..	..	0	Rev. R. Ryder ...	..	..	1
Prof. West ...	..	..	0	G. P. Smith ...	..	..	1
C. B. Joynson ...	..	..	1	A. Bryant ...	..	..	0
<hr/>				<hr/>			
$3\frac{1}{2}$				$8\frac{1}{2}$			

On Saturday, December 2nd, the Senior and Junior Cups were played for, and resulted as follows :—

SENIOR.			
1. Prof. Paton ...	..	78	scr. = 78
2. W. F. Mott ...	..	86	— 5 = 81
3. G. E. Cranstoun ...	..	93	— 7 = 86
4. Prof. Blundell ...	..	92	— 5 = 87

JUNIOR.

1.	T. L. Craven	...	...	98	—	20	=	78
2.	{ E. Henniker	.	...	95	—	16	=	79
	{ B. J. Pero	...	...	104	—	25	=	79

REVIEWS.

STUDLEY COLLEGE AGRICULTURAL JOURNAL. Vol I., No. 1.
December 1, 1905.

With this number the Journal of Lady Warwick's Agricultural College opens a new volume in a slightly different form. The Countess writes a few cheering and excellent editorial forewords as a New Year's message to her 'Daughters of Ceres,' emphasising the importance of "Efficiency." There is full evidence here that the education provided at Studley Castle fulfils much of the object of the founder of the College in training women in the lighter branches of Agriculture and thus providing occupations for women workers. A new opening for students of this College and the College at Swanley is pointed out in this number of the Journal, by Mr. J. C. Medd, namely, as teachers of the study of nature in village schools. Some counties are appointing peripatetic teachers of Nature Study to attend to groups of adjacent schools, giving lessons two hours each morning and afternoon on five days in the week. Gloucestershire has already appointed such a trained lady teacher, who is now stationed at Berkeley, and no doubt other counties will follow, and if a supply of efficient teachers is forthcoming the demand for their services will steadily increase. We wish our contemporary every success and have very little doubt that this will be attained.

MARKET-DAY LECTURES, 1904-1905. Being abstracts of Addresses to Farmers, delivered in the County Technical Laboratories, Chelmsford, on Friday afternoons during the Winter months. Essex Education Committee. Chelmsford. pp. 83.

These lectures were inaugurated by an address by Major Craigie, C.B., who spoke of the interest taken by the Board of Agriculture in the efforts of the Essex County Council to diffuse practical Education among the agricultural classes. A thoughtful and sympathetic address. Among the lecture notes we find some by Dr. Bernard Dyer, Primrose McConnell, Prof. T. H. Middleton, A. H. Matthews, and others. One address is by Mr. W. J. Moss on "The Prevention of Injury by Wireworm." Mr. Moss has succeeded, in certain cases, in "putting wireworms to work," and causing them to clean fields of annual weeds. He discovered the plan some years ago in connection with a field which was in a foul, poor, and neglected condition, and in which barley was drilled with artificial manure (superphosphate). On a small part the manure was accidentally missed. When the barley was about five inches high it was looking strong and thrifty and with almost an absence of weeds, except where the manure had been missed; there the land was very foul with weeds, and only about one-third of a plant of barley held; the wireworms had attacked the barley in preference to the weeds. Where the superphosphate had been drilled with the barley it, being objectionable to them, protected the barley from wireworm attack; but they, being hungry, ate off nearly all the weeds. Since then Mr. Moss uses a fertiliser drill when sowing a corn crop, and deposits artificial manure down the coulters with the corn, the wireworms then help to clean the field of weeds. Mr. Moss also advocates another method of helping over wireworm troubles, viz., using a one-way balance plough and with it burying all rubbish at the bottom of the furrow; ploughing seven or eight inches deep, having no open furrows, but leaving all perfectly on the flat. This also gets rid of twitch, except where the plough goes in and out at each end. These lectures were well attended and did much good in stimulating discussion and exchange of views. We are very pleased that they are printed in a form which will greatly extend their usefulness.



THE LATE GEORGE PATON.

PROFESSOR OF ENGINEERING AND BOOK-KEEPING R.A.C., 1887-1905.

From a Photograph by Messrs. Bassano.

Agricultural Students' Gazette.

VOL. XII.

APRIL, 1906.

No. 6.

The late Professor George Paton.

It is with the deepest regret, which will be shared by all readers of the *Gazette*, that we record the death of our late esteemed professor and friend, George Paton. In December last, at the close of session, he took leave of the Principal, Professors, and Students in apparently robust health and excellent spirits, intending to pass a portion of the vacation in Cornwall. On January the 9th, however, while residing there, he was suddenly struck down by apoplexy and expired before medical aid could be obtained. Of the few particulars known of his early life we may mention that he was born in 1856 on his father's farm in Dumbartonshire, where his father, who lived to the age of 85, was a successful breeder of Ayrshire stock, winning the Shire prize for bulls seventeen years in succession. He was educated at Maryhill Public School and Glasgow University, where he laid the foundations of his exact and extensive knowledge of engineering. After serving some time with a Glasgow firm of Engineers, he accepted office in Japan in company with Professor Alexander, where he remained five years, acquiring great practical experience, and then returned to Scotland to a post on the Clyde Trust. In May, 1887, he was appointed to the Chair of Land Surveying and Engineering at the Royal Agricultural College, which he held continuously till his death. His body was removed from Cornwall and buried in the family burying place near Glasgow. It is impossible to speak too highly of the excellence of his work or of his regard for his duties. Both in class room and in the field he was a model teacher, sparing no pains to secure in every student a full grasp of his subjects. He ever took an earnest interest likewise in the indoor and outdoor recreations, especially in arrangements for the annual sports, the annual theatricals, for the scenery of which he was the accomplished artist, and for the billiards, of the committee of which he was president. To the Principal and his brother Professors he was a loyal and valued colleague, and his counsel in all that regarded the interests of the students and the welfare of the College was ever characterised by earnest sympathy and prudence. He will always be held in the affectionate memory and honour of the College: and his successor, Professor Thain, as well as all of us in our several positions, will have the advantage of his high example of devotion to duty.

J. B. M'C.

Y

CO-OPERATION AND THE BRITISH FARMER.

The Earl of Onslow, speaking as Minister of Agriculture at a large public meeting in London, on the 20th June, 1904, used these words: "The prosperity of agriculture in England, and especially of the small holders, is wrapped up in the progress of the co-operative movement. . . . I do hope that all those—and there are many in this country—who have agricultural interests at heart will not be loth to come forward and assist what I believe is the most important movement in agriculture that has taken place within the last 25 years." With this remarkable testimony in favour of Agricultural Co-operation, no one who is well acquainted with the existing conditions under which England's leading industry is carried on can fail to agree. Many reasons are given from time to time for what is popularly called "Agricultural Depression," *e.g.*, the incidence of local rates, the charges levied by railway companies and other carriers for the freightage of farm produce, distance from good markets, the price of efficient labour, excessive rent, foreign competition, &c., &c., but the main reason has up to recent years been seldom referred to, and still less seldom emphasised in the manner which it deserves. This reason is that the British farmer, with all his practical capacity, associated often now-a-days with some scientific knowledge, is persistently attempting to conduct his business on individualistic lines and thereby earn a livelihood and possibly wealth in competition with continental rivals whose success is mainly, if not wholly, due to co-operative methods. His custom, unlike that of other producers—whether British or foreign—is to purchase the "raw materials" of his industry in such small quantities as he himself may require at the top of the market and seldom from the manufacturer or the importer (as the case may be), but generally from the local dealer or even the shopkeeper; to sell his produce not to the consumer, and often not even to the person from whom the consumer can buy it, but to a middleman or the first of a series of middlemen, each of whom makes his profit out of it; to consign his produce in small quantities, generally unbulked with that of his neighbours, at irregular times at the highest or nearly the highest rates for carriage without any special contract with the carriers. If the steel manufacturer were to conduct his business on these lines, buying, let us say, his coal not by the 100 tons from a colliery but by the cwt. from a coal merchant, and his pig-iron a ton at a time not from the blast-furnace but from a local dealer, and then selling the output of his works for anything it might fetch in an overglutted local market, and he failed to make a profit out of his undertaking, everyone would say that it served him right. And yet this is just what the British farmer is in most instances endeavouring to do, and in many instances finding it equally impossible, often without realising the true reason of his ill success. There is nothing necessarily pauperising about the cultivation of the soil or the breeding and keeping of farm stock, either in continental countries or in Great Britain. The best instance to the contrary is that of Denmark, whose

milk products are poured into this country in larger quantities than those of any foreign nation, are unsurpassed in quality by any similar products produced at home, and are often sold at a price at which it is practically impossible for an English farmer to produce and sell them without actual loss. And yet Denmark, out of these very products is daily becoming increasingly wealthy and prosperous. Whereas twenty years ago she was the poorest country in Europe, she is now for her population (which is almost wholly agricultural) the second richest.

This remarkable change is due to co-operation among the rural producers and—what always follows in the wake of co-operation—the better education of the children in her rural schools.

There is no doubt that self-help in the form of agricultural co-operation is gradually effecting in Ireland something like an economic revolution and is securing for her once poverty-stricken rural population a degree of comfort, if not of actual prosperity, which continuous legislation for many years past has entirely failed to produce, and which could hardly have been anticipated twenty years ago. There are two factors which in our own country militate to some extent against the development of the co-operative movement amongst farmers; the one is racial, the other economic. Amongst peoples which belong to the Teutonic race, and especially our own, there is a strong tendency to individualism, and the difficulty of inculcating the advantages of combination, whether social, political, or commercial, are much greater than amongst peoples of Celtic origin. In addition to this it is said (and with some truth) that the tendency to co-operate will never receive a powerful impetus except amongst those who are driven to it by economic or commercial necessity, and that the prosperous condition of England, even in rural districts, is still too great to favour such an impetus, at any rate for many years to come, if dependent for its origin and growth on the slow and merciless process of economic Evolution only. If these are reasons why British agriculture should, if left to itself, fail to achieve salvation by the methods which are proving not merely the salvation of but the source of prosperity to its continental competitors, they afford the greater justification for the existence of an organisation which will make known the advantages of co-operation, and the possibility which it affords of enriching the occupiers of British soil.

The Agricultural Organisation Society was formed in the year 1901 for this purpose, being founded upon the pre-existing National Agricultural Union, an organisation which had similar objects in view, but which failed because its methods were economically unsound. To this Central Society there are affiliated various co-operative agricultural societies throughout Great Britain, the principal objects of which are:—

- (1) *To aid the farmer in purchasing his requirements to the best advantage.* This is done by obtaining for the members their manures, seeds, feeding-stuffs, implements, etc., from the manufacturers, importers, or large wholesale merchants, at

first hand cost, charging the members a small profit to cover management expenses ; also by securing the purity of feeding stuffs, seeds, and manures, the guarantees for which are often misleading or insufficient for the information of the consumer.

- (2) *To enable the farmer to secure for himself the best market for the sale of his produce, and the greater part of the price paid for it by the consumer, e.g.* (a) By making butter and cheese in co-operative factories ; (b) By the establishment of co-operative egg depôts, where eggs are properly sorted, graded, and packed, by which means better prices are obtained and the consumer is given a more reliable article ; (c) By grading and packing fruit in similar depôts, and, where possible, selling it direct to the consumer ; (d) By starting co-operative markets and so saving the auctioneer's commission and other charges for the farmers themselves ; (e) By reducing the cost of transport ; (f) By bulking consignments and arranging special terms with railway companies and other carriers.
- (3) *To open up remote districts by running Motor Wagons and Lorries between them and a good railway centre.*
- (4) *To hire or buy pedigree male stock for the use of the members at small fees.*
- (5) *To insure Live Stock (and especially Pigs) against accident and loss.*
- (6) *To establish Agricultural Credit Banks.*

These Banks enable persons of good repute to obtain without the deposit of any tangible security small advances at moderate rates of interest to carry them over difficult periods pending the realisation of their produce or their stock at a time when the market is favourable. They are not so necessary for the larger farmers, but are particularly desirable in the interests of small cultivators, allotment holders, and cottage gardeners. All far-sighted men are now in agreement that the migration of the sturdy country-bred population into the towns is becoming a very serious national problem, and there is no remedy more largely advocated to check this migration for the sake of the nation's physique and the increased employment of our working classes, than the establishment throughout the country of Small Holdings. To render these not merely politically desirable but commercially possible, Agricultural Credit Banks are an absolute necessity.

While in the year 1901 the number of Societies affiliated to the Agricultural Organisation Society was 23, in 1903 the number had increased to 73, and in March, 1906, to 125. The aggregate turnover of these Societies has increased in a still greater ratio, the amount being, in 1901, £3,700, in 1903 £40,000, and in 1905 over £250,000.

Although it is generally admitted that Co-operative Distribution and Co-operative Sale are of more importance to the farmer than co-operative purchase, it is found by experience that, whereas it is comparatively easy to start and work a Society for the purchase of farm requisites

in bulked quantities and at times when the market is favourable, it is much more difficult to work successfully a similar Society for distribution and sale, and hence the Central Organisation has been careful to recommend its affiliated societies to commence with co-operative supply even when the greater need of the district was to place its produce in a better and more distant market.

England has been truly described as a "nation of shop-keepers," and it is becoming the source of her greatest weakness. If the greater part of what is paid by the consumer for a country's produce passes not into the pocket of the producer but into that of a large and increasing class who are mere conduit pipes between the producer and consumer, and the producer thereby not merely fails to obtain the due reward of his enterprise and energy and a due return upon his capital, but is in a normal condition of "depression," requiring special and continuous legislative interference of an artificial character for his benefit, that country and any of its industries which are thus "depressed" are in an unhealthy economic condition which cannot be effectually improved until this intermediate class is either eliminated or substantially reduced. This is the condition of Great Britain to-day in respect of its oldest and greatest industry.

I look forward to the time when in every rural district throughout Great Britain will be found not merely an organisation of farmers for the purchase of their "raw materials," but a highly organised machinery for the conversion, distribution, and sale of their produce, which will comprise, *e.g.*, a Co-operative Butter Factory, a Co-operative Bacon Factory, a Co-operative Market, a Co-operative Motor Service, and even Co-operative Slaughterhouses and Butcher's Shops, *all belonging to the farmers themselves*, and securing to them, subject only to the comparatively small administrative expenses, the whole value to the consumer of what they produce. There can be no possible doubt as to the desirability or the importance of co-operation in agriculture, and I sincerely hope that every reader of the *Agricultural Students' Gazette* will be found amongst the active supporters of this great national movement.

CHARLES BATHURST, JUN., M.R.A.C.

DETERIORATION.

In these days when so much is said and written on economic questions, it is extraordinary how little attention is given to the agricultural side of the question. Of some aspects of the economic side of agriculture practically no notice at all has been taken.

In this connection stands prominent, but apparently unnoticed, the enormous loss of capital that has taken place during the past twenty-five years, and is still going on, in the more permanent of farm improvements. The fences, roads, drains, and last, but not least, the fertility both as to physical and chemical condition of the soil are

improvements absolutely necessary to the farm. They are costly to make although the cost is very often spread over years and therefore not so noticeable. When once made the life of some of them, with more or less annual upkeep, is practically permanent—of others the life amounts to many years. But if the annual maintenance is intermitted or inadequately done for a few years, there is the probability that the original outlay will be lost. That this outlay was made by a previous owner or tenant does not prevent its still being a loss.

Now, without attempting to generalise for the whole country, it is perfectly certain that over large areas the fences are neglected, the ditches inadequately kept, the roads deteriorating, the drain outlets choked, and the cultivation much less thorough than was the case in more prosperous times. There are several causes to account for this state of affairs, which has gone on so long as to amount to an immense loss of capital value, or, to put the same fact differently, to a great cost which must be incurred before the original condition is regained.

The enormous diminution in the earning power of land owing to the fall in agricultural prices is one cause, and perhaps the most important. But, coincident with this, the cost of farm labour has increased very greatly. Not only has the actual cost in money of labour increased, but the condition of the labourer has improved and he expects more leisure and comforts. Even the seasons have had considerable effects as, *e.g.*, a succession of dry years encourages neglect of drains.

The matter is further complicated by the fact that the ownership of land in England is very rarely a commercial transaction. The fortune made in business or the rent from town property supports the owner, and he rarely expects and certainly does not get (in spite of the agent's advertisement of a 5 % return) more than a very low rate of interest for money laid out. He does not buy a business but certain amenities of pleasure and position arising from the ownership of land. This of course is not necessarily a disadvantage to the community, but it prevents the conditions from ever being on a firm commercial basis. As a nation we have sacrificed our agriculture to our manufactures, and but for the pleasures and ambitions of the retired manufacturer the position of agriculture would be still worse than it is.

To find remedies or even palliatives for this state of things is impossible. It forms part of a great and deliberate policy which the nation has adopted. But it is wise to call attention to it, and to call attention to the changes in conditions which would tend to remedy it. For the loss is not by any means over, it is annually increasing and is immense.

One remedy would of course be the increased earning capacity of the land: for these things are neglected not from the farmer's wish but because he cannot afford the cost. Increased earning capacity of the land can only come in a few ways. Higher prices for produce would be one; and as the empty places of the world fill up and virgin

fertility is exhausted prices will tend slowly but surely to appreciate, but too late to arrest the loss in question. But higher prices for produce mean increased cost of living and of labour, and this fact should not be forgotten.

Increased production from a given quantity of land is another factor. Unfortunately the limit appears to have been reached. Extra blades of grass and extra bushels per acre are expensive. Each bushel costs more than the last, and a rise in price (or a diminution in the cost of labour or other outgoings) is necessary before there would be much alteration.

Diminished outgoings in the shape of rent, rates, and taxes would help, but there seems little likelihood of their happening. Already, as pointed out, farms only pay the landlord a very small return on their cost. And there appears to have arisen a class of farmers who make a living under existing circumstances. The demand for farms does not diminish—on the contrary it tends to increase. But this class of farmer, *and herein lies the root of the evil*, exists and makes his living by a policy of cheeseparating. It is probably forced on him by necessity rather than choice, but the successful farmer to-day is generally one who never spends 6d. where 5½d. will do. The result is the evil that it is the object of this article to call attention to. Should good times for the farmer recur immense sums will be necessary to restore things to the condition of greater and more profitable production.

The labour bill is higher and the cost relative to the result higher still. The sum in hard cash that would pay four labourers 20 years ago will now only pay three. They work shorter hours, and have generally been enticed from the farm to the town just when they ought to have been learning the technique of their trade.

All this is not satisfactory or encouraging but it should be placed on record as yet another of the weak spots in our present system. Such prosperity as there is in farming is only being purchased at the expense of the manufacturer and with immense loss of the productive power of the land.

J. HENRY DUGDALE, M.R.A.C.

AGRICULTURE IN THE SOUTH-EASTERN COUNTIES OF SCOTLAND.

A short account of agricultural methods and practice in the south-eastern counties of Scotland may, perhaps, be of interest to students of the Royal Agricultural College, more especially as the system followed in these districts is entirely different to that which prevails in Gloucestershire.

The counties which it is intended to include within the survey of this article are: Berwick, Roxburgh, Haddington and Selkirk. Of these the two foremost are the most typical of farming in the Scottish Border counties, there being many important modifications to note in the case of the two latter counties.

From the last completed Agricultural Returns—those for 1904—the following particulars are derived :—

	Berwick. Acres.	Haddington. Acres.	Roxburgh. Acres.	Selkirk. Acres.
Total area	293,900	171,371	428,497	172,550
Total average under crops and grass ... }	192,053	112,026	182,855	29,877
Wheat	1,375	4,467	368	—
Barley	19,600	15,397	12,024	193
Oats	32,975	17,302	28,072	4,710
Beans and peas ...	841	434	339	—
Potatoes	2,404	9,041	1,292	200
Turnips and swedes ...	26,410	15,192	20,662	2,568
Mangels, cabbages, rape, &c. ... }	1,258	1,363	1,226	198
For hay	10,428	10,897	8,911	1,074
Not for hay	48,902	16,030	40,777	8,154
Rotation Grasses.				
Permanent pasture ...	47,451	21,450	69,049	12,769
Mountain & heath land	70,080	38,190	216,434	133,172
Plantations	15,378	10,472	16,285	4,942
LIVE STOCK.				
Horses used for agri- cultural purposes ... }	5,410	3,616	4,087	657
Cows and heifers ...	3,047	1,928	4,731	1,213
Other cattle	14,782	7,416	14,496	1,868
Ewes for breeding ...	114,000	40,289	208,025	83,128
Other sheep	205,584	83,225	314,982	98,063
Pigs	4,595	1,956	3,288	535

CROPS.—It will be seen from the foregoing statistics that the Counties of Berwick and Roxburgh present a great many features in common, and that with regard to the arable land there is a quite remarkable adherence to the five course rotation of cropping, viz., 1, oats; 2, turnips, potatoes, etc.; 3, barley or oats; 4, young grass; 5, two years grass.

The second year's grass is usually ploughed in course of the late autumn or winter, and is sown with a crop of oats in the spring. It is not an altogether uncommon practice, however, to take a crop of potatoes, or even turnips, direct off the lea. The oat stubble is ploughed as

quickly as possible after harvest, and if farmyard manure is available, it is considered the best practice to spread and plough it in the stubble. If this cannot be done, the manure is carted out during the winter to a heap, and spread in the drills as the turnips are put in. All turnips are grown on the ridge, the system of sowing on the flat, as commonly practised in the South of England, being quite unknown. The turnip crop, in addition to the liberal dressing of farmyard manure, usually receives a good application of mixed artificials as well.

If potatoes, cabbages, or similar crops are grown on part of the fallow break, the land is generally ploughed a little deeper in autumn, and a liberal dressing of artificials applied with the seed. The climate is one well suited to the turnip crop, and a heavy yield is usually obtainable on any soil of ordinary quality. From half to two-thirds of the turnip crop will ordinarily be drawn off for feeding cattle, the remainder being consumed upon the ground by sheep. If the whole or greater portion of the turnip crop was eaten on the land, in soils of average fertility, the succeeding crop of barley would probably be over-luxuriant, and lodge before harvest, to the detriment of the crop, and of the young grass sown amongst it.

Potatoes are in most cases only grown to a sufficient extent to supply the requirements of the farmer and farm servants, although parts of Haddingtonshire form a notable exception to this rule. The turnip or potato crop is usually succeeded by a crop of barley or wheat, or, on the higher and poorer lands, by oats. With this corn crop are sown the grass and clover seeds of a mixture suitable to lie for one, two or three years. On some farms the grass is only retained for one year, making a four-course rotation, but this is exceptional. The usual practice is to reserve a good proportion of the one year's grass for hay, and to graze the whole of the second year's grass.

While the foregoing system of cropping is the one most generally adopted, there are, as in other districts, innumerable modifications in individual instances to suit particular circumstances. Catch cropping is not possible owing to the climate—probably more on account of the cold bleak weather often prevalent in the spring, rather than to the actual severity of the winter. Mangels are little grown, and unless in a warm favourable season do not yield a heavy crop. A few acres of cabbages are very commonly grown for use in autumn.

Beans and wheat are cultivated to a considerable extent in the south-eastern corner of Berwickshire, where the soil is for the most part of a stiff nature. Wheat is both autumn and spring sown, according to circumstances of cultivation and season. Autumn sowing is preferred, and wheat commonly follows a potato crop at that season.

It will be noticed from the statistics given that the proportion of permanent pasture is comparatively small in all the four counties under consideration, and even of this area a considerable part is situated in the parks surrounding country houses. These parks are generally let by auction every spring, and the grazings rented for the most part by adjoining farmers for both cattle and sheep.

The County of Haddington has long been famous throughout the Kingdom for the excellence of its agricultural practice, and its high state of cultivation. On all the richer low lying lands along the south side of the Firth of Forth the rotation known as the "East Lothian six course" is commonly followed. Under a special modification of this system on the red soil potato land in the neighbourhood of Dunbar one-third—that is two sixth breaks—of the arable land is commonly under potatoes in each year. Such methods of cultivation naturally entail very heavy manuring and the employment of a large amount of labour.

There is little arable cultivation in Selkirkshire, a high lying inland county mostly devoted to sheep pasture and moorland. As will be noticed from the returns given, no wheat and hardly any barley is grown, the two cultivated crops being almost entirely oats and turnips.

STOCK.—The horses kept for agricultural purposes are almost exclusively Clydesdales, and while none of the four counties are very specially concerned with breeding, there are nevertheless within their bounds several farmers whose names are well known in the Clydesdale world as successful breeders and exhibitors.

There are also some good Shorthorn herds in the district. The main industry, however, so far as cattle are concerned, is grazing and feeding, rather than breeding. This feature is not by any means shown to its full extent by the agricultural returns, as the stock of cattle in the district is comparatively small at the beginning of June when the returns are collected. Very large numbers of Irish and Cumberland lean cattle are brought into the markets in the course of the autumn, and are fattened and sold off during the winter and spring.

Although a large number of cattle are thus fed annually, the principal stock industry is that of sheep, more especially in Roxburghshire, which carries, according to the returns, the remarkable stock of $1\frac{1}{4}$ sheep per acre over the whole county. This is a proportion which is unequalled by any other county in Scotland, and is only approached by the counties of Berwick and Selkirk, which both show slightly over one sheep per acre. On almost all low ground arable farms, the breeding flock is composed of half-bred ewes—that is, the Border Leicester and Cheviot cross. These ewes may be either a first cross or half-bred out of half-bred. The hill stocks are almost entirely of the Cheviot breed, although Blackface have been introduced and made some progress in recent years. The half-bred ewes are usually put to a Border Leicester ram, the lambs thus being "three-quarters" or "three parts" bred. Oxford and Suffolk rams have been employed to an increasing extent in recent years, and it has been found that the resulting crop of lambs is, if anything, larger, inclined to grow more rapidly, and thus to be more quickly ready for the market.

On the lower lying and more favoured hill grazings the Cheviot ewes are commonly put to a Border Leicester ram in order to obtain first cross half-bred lambs. The ewe lambs of this first cross are in considerable demand by low country farmers for the purpose of keeping

up their stock of breeding ewes. On the higher and more exposed hill farms the Cheviot ewes bring Cheviot lambs only.

The months of August, September, and October are amongst the busiest in the year for the flockmaster, and during that period an immense number of sheep change hands at the numerous sales held throughout the district. The low ground arable farmer most probably retains all his lambs, and possibly buys others as well, to fatten and feed off on turnips. On the upland arable farms and hill farms the greater part of the lambs are sold off for feeding elsewhere. After the lamb sales are over the draft ewes are disposed of. The half-bred young ewe, or "gimmer," brings her first lamb at two years of age, but in the case of Cheviot sheep the first lamb is not as a rule taken until the third year. Three crops of lambs are as a rule taken from both half-bred and Cheviot ewes before they are disposed of as drafts. There are innumerable points in connection with the sheep farming of the border district, which might be written about at great length, but space forbids in this instance of any further digression on this particular branch of a larger subject.

Pigs are not kept in any large numbers in the district, although a fair number are bred and fattened on many farms in the course of the year. The pigs kept are almost entirely of the Yorkshire middle white variety. Berkshire or Tamworth pigs are rare, if not unknown.

As in other districts in Scotland the men and women employed on the farms almost invariably reside in houses belonging to the holding, and within a short distance of the steading. This is naturally an arrangement of the greatest advantage both to the farmer and the farm workers. No "horsekeeper" is employed, but every ploughman looks after and feeds, as well as works, his own pair of horses. The engagement of farm servants is by the half-year or year, commonly the latter, and the wages paid would seem very large to the agricultural labourer in Gloucestershire. The money wage paid to a ploughman generally runs from 16s. to 17s. per week, with 800-1,600 yards of potatoes, a free house and garden, and coals carted. Occasionally a farmer undertakes a cow's keep and in this event the money wage is reduced by about 2s. per week. Women workers receive 10s. to 11s. per week, and extra in harvest. It is thus not an uncommon thing where three or four of one family are working for upwards of £150 in money to be received by one household in a year, besides allowances. Shepherds—especially on hill farms—were at one time paid by being permitted to keep a "pack" or small flock of sheep of their own, in lieu of money wages. This practice still continues, but is tending to disappear.

The farm houses, cottages, and steadings are usually of a most comfortable and substantial nature, built of stone with slated roofs. Wood and iron shedding is perhaps becoming a little more common, but on the whole the more permanent masonry is preferred.

As in all other parts of the Kingdom, rents have fallen very materially within the last thirty years, the amount of the fall varying from about 30 % to 50 %. Very large arable farms, hill farms, and

inferior arable land have fallen most in value, while rich land, situated on farms convenient in access to railways and markets, have suffered least. Good arable farms in the Tweed valley may still command rents of 35s. per acre, but such land is strictly limited in quantity. The Dunbar "red soil" potato land is worth 84s. per acre of rent over a limited area. Hill farms are usually valued according to the sheep stock which they carry. The rent for Cheviot sheep usually works out from 5s. to 6s. 6d. per sheep, according to circumstances.

J. H. MILNE HOME, M.R.A.C.

A LEGEND OF THE COTSWOLDS.

The other day I came across a slim green book in the unpretentious binding of the fifties entitled "Chavenage, A Tale of the Cotswolds," and to anyone who has known and loved the dear Cotswold country there could not fail to be an irresistible fascination in any such name. Of course I immediately opened and read it, and was quite well rewarded for my pains. The book was written by one R. W. Huntley, M.A. "late fellow of All Souls, Oxford," and published by John Burns, of Portman Square, in 1845. The actual story is in verse with a long prose preface explaining the origin of the legend, and both are written in the somewhat pompous English of a more leisured time than ours.

In the preface the writer begins by pointing out that Gloucestershire is no whit behind other counties in the richness of its legendary lore, and continues—"The present small volume purposes to rescue from entire oblivion, one of these traditions not altogether unconnected with the general history of the Kingdom." The hero of the story is Nathaniel Stephens, of Chavenage Manor, "Knight of the Shire of the County of Gloucester," who appears to have been an ardent though discriminating supporter of the Parliamentary party during the troubled reign of Charles I. He seems to have thrown all his influence on the side of moderation, as is proved by one of his speeches transcribed by himself, "The speache I made whether we should make any farther application to his Majestie as neare as I can remember it, this, 3 Maii, 1645." At the time Mr. Huntley wrote his poem, the MS. was in the possession of Mr. Townsend Stephens, of Chavenage, and is largely quoted in the preface. Its tone can be gathered from the following extracts—"Neither can we say but that God may give a blessing to the 8th, although He hath not to the 7 formerly sent. . . . For the Peopell did hope that by the wisdom of the parliament all differences would have bine reconciled and peace settled; but upon the voates they saw that that was impossible to be done, whereby it appeared that the parliament must of necessity keep up a great army to maintaine themselves and their party, which of necessity must bring a vast charge upon the Kingdome, which must come out of their purses; and he that will meddell with the

Peopell's purses shall be suer to lose their hartes and get their curses." Which last statement would seem to prove that the "peopell" in the seventeenth century were very like the "peopell" in the twentieth.

Nathaniel Stephens, however, firmly refused to join the extreme party in favour of the King's death, and it was not until the Christmas of 1648, which he spent at Chavenage, that he gave in. While Stephens was keeping Christmas at Chavenage, Ireton arrived at the house "with a view to press his instant attendance in Parliament to support by his vote and influence the intended measures of Cromwell against the life of Charles." Stephens was very unwilling, and his sister, Abigail, is said to have done her very best to dissuade him from doing anything of the kind. So strong was her feeling in the matter that she even prophesied the extinction of his race if he let himself be overruled. But Robert Stephens, Nathaniel's brother, was all in favour of Ireton, and together they spent the night in entreating the lord of Chavenage to comply. Finally, although Nathaniel's feelings were quite opposed "to the murder of his King, and although he even imagined himself to have been warned in a vision not to take any part or lot in the matter, he ultimately suffered himself to be persuaded, and departed with Ireton."

In the following May, "he was seized with a fatal sickness, and feeling his end drawing near summoned all his relatives that he might bid them farewell and express his regret for participating in the execution of the King. When all his relatives had assembled and the courtyard was crowded with carriages, "and the sick man was even now breathing his last, the household were surprised to observe that another coach, ornamented with even more than the gorgeous embellishments of that splendid period, and drawn by black horses, was approaching the door in great solemnity. When it had arrived, making a short stay, the door of the vehicle opened in some unseen manner, and clad in his shroud, the shade of Nathaniel glided into the carriage, and the door instantly closing upon him the coach rapidly but silently withdrew from the house—" not, however, before the spectators had time to observe what Mr. Huntley put into the mouth of one of his characters, "Hugh Peters," a puritan pastor—

"And lo ! Aloft there sat the headless King—
Bright shone his star, sin's gauds are ever bright,—
Clear the vain garter gleamed upon my sight,—
And "honi soit qui mal y pense" there shone
So keen it pained my eyes to look upon ;
His jewelled sword was there,—his ermined pride,—
As though the sceptered monarch did preside,—
But when the phantom to the gateway came,
The vision vanished in sulphureous flame."

The poem is all in the same strain, and pages of it are taken up with the misgivings, in the first place, and the remorse in the second, of the unfortunate Nathaniel. Like many other poets, Mr. Huntley has found the exigencies of Rhyme more arbitrary even than historical accuracy, for as he somewhat quaintly explains—"In the story now offered to

the public the name of Nathaniel has been changed into Richard, which was his father's appellation, and is more suited to versification, Rachel's real name also was Abigail ; this has likewise been considered too intractable for poetical purposes ; while that she might stand more in agreement with the habits of her age, a name from the Holy Scripture has been selected for her ; which perhaps is due to the piety of the family, as we have deprived Nathaniel of that distinction."

The story of the apparition assuredly gained ground as time went on—

"and the tale was spread

By every ancient melancholy maid."

Moreover, "the legend further maintains that to this day every lord of Chavenage, dying in the Manor House, takes his departure in this ominous conveyance." So that one could understand it, if, on occasion, the Lords of Chavenage preferred to die elsewhere.

Rudder, in the volume of his "new History of Gloucestershire," dealing particularly with Cirencester and its neighbourhood, positively bristles with references to the family of Stephens, who, in various branches, were to be found all over the county. Originally the family came from "Easington," now Eastington Manor, but Chavenage, or as it was then called "Chavenydg," was bought by Richard Stephens, of "Easington," from Sir Walter Dennis, in Elizabeth's reign, and settled by him upon his wife. "And," says Rudder, "this manor and Estate have continued ever since in the family."

Mr. Huntley gives the full pedigree of the Chavenage family, and is careful to point out that the dates in the poem do not coincide with those given by Rudder and the family tree. For according to the latter, Nathaniel Stephens of the Civil Wars did not die until 1660, and Abigail was his daughter, not his sister. "In the poem, however, the legendary relationship has been preserved, as it seems to confer on the characters a more natural right of the free discussion of the momentous subject under their consideration."

The village of Horsley itself is full of interesting associations, and the Reverend Messer Rudkin in an interesting little monograph upon the village, written in 1884, says "Very few parishes possess such a complete set of registers as Horsley. The earliest register bears marks of extreme age and is quite three hundred years old—and as regards the names of the people, their names in the days of Elizabeth differed but little from the Horsley of the 46th year of Queen Victoria—so little change in 300 years is remarkable."

The Reverend Dudley Fosbrook in certain of his notes about the village mentions the fact that "the place has abounded with authors," and to this, as much as to the "ancient melancholy maids" of Mr. Huntley, we may owe the preservation of the Chavenage legend. "You are a man of Dursley" was the old Gloucestershire form of reproach to anyone who had broken his promise, is it possible that they of Horsley were somewhat prone to exaggeration ? In a neighbourhood "abounding with authors" such a charge might not be accounted wholly groundless.

O.S.

ITALIAN FARMERS' CLUBS.

The principle of co-operation has taken deep hold of modern Italy. Co-operative stores and building societies abound, therefore it is natural that the principal industry of Italy—Agriculture—should have tried its hand at combinations. These have had two objects, purchase and sale. As far as regards sale of produce, they have, generally speaking, been utter failures. As far as I am aware, outside of the wine and dairy trades, there has been no successful attempt of the cultivators to combine in marketing their goods. Neither wine nor cheese are primary products, so that their successful manipulation and sale is rather a question of a secondary industry, dependent on agriculture, than of agriculture itself. Not long ago an attempt was made to eliminate the middle men in the fruit trade between Tuscany and Germany, which is large and increasing yearly. The profits of the middle men appear great on paper. Nevertheless the association of growers, formed for the direct sale of fruit, has been so far a failure.

Turning to the other side of the question, the combinations for the purposes of purchase have been extremely successful. If the Tuscan farmer sells wholesale, at least he buys wholesale as well. The fundamental reason for this is that the working farmer of Tuscany belongs to an estate, large or small, at the head of which is the landlord or his agent, and they buy all manures, seeds, etc., for the estate. It is, therefore, easy for a given number of these head-men to combine and purchase their goods in common.

The parent society in Tuscany was founded at Florence, in 1889. The membership increased rapidly at first, and rose to about 1,500. Of late years the numbers have fallen again because there are daughter societies in every district, but the exact number of members in any one makes no real difference, as they are all affiliated to the main Italian society, and make their purchases through it. They differ considerably in their constitution and method of action. The Florentine society, which remains a rich and powerful one, undertakes a good many functions for its members.

Each member has to pay 10 francs per annum in advance. There is no other liability whatever. In return for this 10 francs, the member obtains a magazine published twice a month, and the use of a room in Florence. These are all the direct advantages that accrue to members. The indirect are, however, considerable. First of all, no one is allowed to buy from the head association except through the local society. The value of this privilege varies.

The quality of the goods is always high. Manures are analysed, seeds are tested. The best qualities of seed wheat are a great feature of the Florence club, wheat being an important crop in the neighbourhood. Prices are fairly satisfactory. The club acts in three ways: First, they buy large quantities of articles in common use. These articles are very few, in fact confined to one or two chemical manures, sulphate of copper, and flowers of sulphur. The last are used in the vineyards. On a part of these articles the Society takes a certain risk

by selling them retail to members. A large part, however, is taken over immediately by members who contract to take so many tons at a given price, thus very much diminishing the liabilities of the Society. Among the articles treated in this way I should add cattle cake.

The second class of goods comprehend manures and seeds which are sparingly used. The Society ascertains their price, and sends round to members circulars with particulars. The purchases are then made in accordance with the answers, the Society taking no risk at all in the matter.

The third class of goods are such as are still less used. These are displayed in sample in the Society's room, and the officials are always ready to give an intending purchaser information, and to put him in communication with the seller. When the Society moves into its new rooms, which it will shortly do, it is hoped to extend this into a sort of agency for the sale of produce. Even now it is extremely useful. The Society, in certain cases, receives or collects money between members, but without any guarantee. The common run of manures, seeds, and cakes which the Society sells are 10 to 20 per cent. less in price than they are in the open market. This is the real reason of the success, when combined with the most scrupulous care in quality.

Apart from the purchase and sales in which it acts as agent for the head society, the Florence club has various activities.

The provisional balance sheet for 1906 has just reached me. It gives an income of £640, derived in the following ways: Contributions of members, £520. There are 1,300 members at the present moment. Outside subscribers to the paper bring in £40. Government and communal assistance is to the amount of £50. The remaining £30 is made up of payment for advertisements, interest of money at bank, etc. It would be easy to increase the amount derived from advertisements, but so far the policy of the very patriotic and straightforward men who have directed the Society has been against using it as a commercial agency for pushing the advertiser who is willing to pay most. One of the principal reasons for its success has been the very high character of the men who have governed it in the interest of the members, without regard to making money beyond what was necessary for the existence of the society. The expenditure is made up as follows: Cost of printing and publishing the paper, and other publications of the Society, £155. Perambulating lecturers on agricultural topics, £40. Cost of administration takes up £170. The rest of their income is spent on prizes given for competition, chiefly for cattle. This part of the Society's work exactly resembles that of a farmer's club at home. The lectures and experiments are more important than would appear by their small cost. The lecturers mostly give their services gratis, and the land and labour necessary for carrying out the experiments are also given free by landowners. There is no one feature of the Florence Society which is not to be found in some society of the kind in England, but the combination of so many in such a limited area makes it a very useful and popular body.

The principle of self-government is strongly rooted. The government of the Society is vested in a president and vice-president, secretary, and 12 councillors, all unpaid, except the secretary. All are elected by general vote of the members for three year terms.

The paper of the central Society is the organ of many of the daughter societies. These little associations are flourishing and growing rapidly. To take a typical instance, last year one was founded in the upper valley of the Arno, some 20 miles from Florence. This year it has 200 members, and has sold to them 20,000 francs' worth of goods. It has also started some experiments in manuring wheat, and given a certain number of lectures on agricultural subjects. This is not bad for a backward and sparsely-populated district.

The Society of Pontedera, a small town between Pisa and Florence, has started the sale of fruit belonging to its members. The direct results so far do not appear to have been a success, but the attempt had the effect of raising the price of grapes on the open market from 9 to 12 francs the cwt. The real difficulty in all attempts to sell by means of the co-operation of producers is that the sale of anything on a large scale requires a business training, and the salary a good man demands eats up the profits, unless they are very large. A great deal of work has been done in Italy in the direction of providing bulls and stallions by co-operative associations. These work on much the same lines as in Great Britain. Another feature of the societies is their lending out expensive implements—such as winnowers—to members, for a daily payment. Still another, is their arranging loans for their members at a bank. The Society acts as a go-between without fee, but takes no risk.

This action of the societies has lowered the rate of interest, but until agriculture becomes a much more certain industry than at present, to encourage men to improve their land with borrowed capital can never be good for a country in the end.

To sum up, all purchases are influenced by combination of the agriculturist in the more advanced districts of Italy. Sales are so influenced to a very limited extent, but this will increase in the near future.

H. HARTLEY, M.R.A.C.

TARIFF REFORM AND AGRICULTURE.

In the following brief notes I do not attempt to discuss the advantages or disadvantages of Protective Tariffs upon the English nation as a whole. For the present the Tariff question is relegated to an occasional abstract debate in a hostile House of Commons, but before many years are past it will in all probability resume its aggressive form, and in the meantime all practical men should be preparing their minds and acquiring knowledge which will assist them in forming an accurate opinion and in choosing the right side when the time comes for voting on the subject.

Of the three great agricultural classes,—labourers, tenant farmers, and landowners, two certainly do not take a leading part in the government of the country, and the influence of the third seems to be steadily decreasing. Nevertheless general interest in rural matters is reviving, and most dwellers in towns as well as those on the land have their own theories on the provision of small holdings, the cost of labourers' cottages, and similar subjects. It is desirable, then, that every member of the rural classes should attain a clear conception how Protection, in its various kinds and degrees, will affect his position.

The most moderate school of tariff reformers advocate that duties should be confined to manufactured articles which are not of the nature of human food, the first necessity of life. The effect of some well-chosen duties of this sort is expected to be beneficial to the wage-earning classes in the manufacturing centres, for they will take good care to get a large share of the increased profits of their employers. The wages of rural labourers may be expected to improve in sympathy, rural labour will be scarcer than ever, the farmers and landowners will lose what their employes gain and in addition will probably have to pay slightly higher prices for their machinery, fencing, buildings, and indeed for most of their manufactured requirements.

A rather more advanced class of reformers go so far as to say that there should be a prohibitive duty on imported flour; this would not raise the price of bread, but would give more employment to English millers, and consequently there would be more and cheaper offals for the farmer to buy for his stock; this would be welcomed by the dairyman, the breeder and the grazier.

The out-and-out Protectionists ask for a duty of 2s. per quarter on foreign corn, and for small duties on foreign meat and dairy produce. A tax of 2s. on foreign corn has been roughly estimated as equivalent to 1s. upon all the corn that comes into England, whether from foreign countries or from the colonies, as the corn from the latter would pay no tax. The arable farmer who succeeds in producing 500 quarters of wheat in a year will benefit by the princely sum of £25, which can hardly be described as a sudden access of wealth to a man who is probably paying some hundreds a year in rent alone. In all likelihood it will not even recoup him the increased cost of the labour and machinery required to grow the corn. To add to this negative benefit, colonial corn coming in free will in course of time oust the foreign corn altogether, and even this small advantage of £25 per annum will then disappear.

The small duties to be imposed upon meat and dairy produce will be about as helpful to the dairyman and grazier as the wheat tax to the corn grower. Any small benefit derived from them will fade away in the course of a few years. The hope that such duties will form the thin end of a wedge which can be pressed home until some substantial advantage accrues to the farmer will be at once crushed by the townfolk.

There is a possibility that the position of agriculture may improve

in a general and indirect way as a result of the increased prosperity of the whole country ; the working man ought to be better able to pay a fair price for the good home products of the farm instead of buying any cheap imported stuff which masquerades under the name of food. But the experience of the past does not point to such a result ; when the manufacturers were especially prosperous in the late eighties and early nineties agriculture was suffering from the severest depression ; on the other hand, since the South African war, while the country as a whole has gone through a very bad time, farmers have been coming up to the scratch on rent days with rather more cheerful faces, especially in the pasture counties, and have been adding to their head of stock and carrying out minor improvements out of income. It does not seem fair to suppose, therefore, that good times for the manufacturing towns are necessarily accompanied by rural prosperity.

To sum up, then, the rural labourer stands to gain by Protection to some extent, but his gain will be a certain loss to his employer, with only doubtful advantages to set against it ; while the landowner, if he is still allowed to call his land his own, will be no better off than before. Pasture land will, however, stand to lose less and to gain more by the imposition of reasonable tariffs than the large arable farms ; on pasture holdings the slight increase in prices of produce may counterbalance the greater cost of the small amount of labour required. It is my earnest hope that Protection may come and come soon, and I still more earnestly desire that these somewhat dismal prognostications of its effect upon agriculture may not be verified.

F. A. S. GOODEBODY, F.S.I.

ARTIFICIAL NITRATES AND THE PRESERVATION OF SOIL INDUSTRY.

In these mechanical days when man is assuming more and more the direct control of energy for his own ends, when horses are being superseded by motors and manual labour by machinery, and when there seems to be a danger of his imposing on the larger forms of life, the alternative of extinction or compliance with his æsthetic or utilitarian standards, it is refreshing to think that he is still, and, as far as can be seen at present, always must be dependent on the functioning of many forms of life for his food.

The crops he grows are perhaps dull and tending to uniformity, his cattle mere meat or milk producing machines, and aberration from type even in the matter of colour is condemned ; but through it all we see the vital energy of nature teeming up from below with endless adaptations for an increase with which only nature herself can cope. Here a blank where wireworm or " fly " have destroyed the promise of swedes, there a patch where rabbits have eaten the rising corn, or perhaps the whole of some crops destroyed by fungus disease, reminds

us of the penalties that a thoughtless upsetting of nature's balance entails, and we reflect upon the birds and weasels destroyed and realise that we have imposed too entirely artificial conditions on our crops.

Side by side with the increase of man's power there is therefore, thanks largely to agriculture, a growing appreciation of the advantage of directing nature without attempting completely to control her, an appreciation which is tending more and more towards the preservation of varied forms of life, which, if less specialised than man's machinery, at least contain within them the essence of an infinite adaptability.

It is therefore with some misgivings that one contemplates the prospect of the usurpation by man of the control of the supply of one of the fundamental necessities of life—combined nitrogen.

Nitrogen composing about four-fifths of the atmosphere is yet one of the most difficult of the commoner elements to obtain in a state in which it is of any but negative value, and man has till recently been compelled by economic necessity to leave its original fixation entirely in nature's hands. And it must be confessed that it is not any failure on the part of nature, but simply the white man's one-sided preference for cereal foods, that has made any supplementary effort necessary.

General interest in the supply of nitrogen for the world's crops has again been aroused by the production of calcium cyanamide, and still more recently by that of nitric acid and calcium nitrate on a commercial scale at Notoden in Norway, by direct combustion of the atmosphere. An instalment for the same purpose has also been erected at Carnlough in Ireland,

Sir William Crookes' paper, read at the Bristol meeting of the British Association some years ago, has been reprinted. In this he apprehends a scarcity of wheat in about twenty-five years time, and invokes the aid of science to assist agriculture by the artificial fixation of atmospheric nitrogen.

Now the possibility of efficiently supplementing the supplies of combined nitrogen in this way is undoubted, and though any such large consumption of concentrated physical energy as would be necessary visibly to affect the world's wheat crops by this means must always be a serious matter, yet the cost may not be a permanent obstacle.

But the fact should not be lost sight of that when any of nature's functions becomes unnecessary it ceases, and what is more, this particular function of nitrogen fixation has already given proof of its want of permanence under such conditions.

As nitrogen occurs commonly in inorganic nature only in a free and inert state, the fixation of atmospheric nitrogen must originally have been a function of all nitrogen containing organisms. It has, however, long been a lost art even among the lower types of plants.

They have doubtless grown out of it owing to parasitical habits developed in the presence of an excess of supply, just as fungi and some higher plants have grown out of and lost the art of the direct utilisation of carbon dioxide.

In fact it seems possible that the synthesis of nitrogen compounds by plants may be of greater antiquity than that of carbon compounds. Modern vegetation may be the descendant of some much more ancient type which flourished under conditions more favourable to the assimilation of nitrogen and less so to that of carbon. Lowly jelly like organisms these, they may have persisted for some time after the larger carbonaceous plants appeared, contributing nitrogen to their support, and eventually as these latter shut out the light, have become in turn parasitic on them and their remains for their supply of energy.

But in any case the fact remains that so far as we know almost the whole of the combined nitrogen in the world is now "fixed" in the first instance by organisms of the lowest type, the higher plants making use of this supply and providing in their turn carbohydrates for the food of saprophytic and parasitic organisms and of animals.

The extent to which this may go on is well illustrated by one of the experimental grass plots at Rothamsted, which has received cinereal manure only for the last fifty years. An average crop of over two tons of hay per acre, 55 per cent. of which now consists of leguminous herbage, is removed per annum, and this means a continuous output of about ninety lbs. of nitrogen in combination per acre.

There is no doubt that in the face of large extraneous supplies of combined nitrogen the activity of these organisms progressively decreases and finally disappears. Thus the demand for such supplies will increase in proportion as it is complied with.

Now a normal English crop of wheat will remove about forty-three lbs. of nitrogen per acre, and it is therefore clear that there would be no need of purchasing nitrogenous manures if the question of encouraging the normal fixation of atmospheric nitrogen were seriously considered by farmers.

Unfortunately on land that has been long under cultivation the best conditions are not sufficiently favourable to such fixation of nitrogen for the possible benefit to be appreciated, one of the conditions—an ample supply of organic matter, being always absent; and there is therefore a disinclination on the part of the farmer to take very seriously into consideration the well-being of these bacterial crops that are so fundamental to success.

It may seem paradoxical to suggest that farming practice should be based primarily on such considerations, but a rough sketch of a system based thereon may serve to show that no revolutionary change will be required. The requisites for large and efficient crops of nitrogen-fixing organisms are, briefly, the same as those for ordinary farm crops, special emphasis, however, being laid on the presence of much organic matter in the soil and the growth of leguminous plants; but the consideration of an adequate supply of nitrogen may be neglected. A sufficiency of organic matter in the soil is of peculiar importance. These organisms, living as they do beyond the reach of the sun's rays, must obtain their food in an organised form. Those that are saprophytic, and these are not unimportant, have no other

source of supply than decaying organic matter, while there is reason to believe that its absence is largely responsible for the frequent failure on tillage land of the leguminous plants generally necessary to those that are parasitic.

One of the principal aims of such a system would, therefore, be the maintenance of an adequate supply of organic matter in the soil.

The land would be kept covered as much as possible by the growth of catch crops, the sale of bulky crops and the growth of meagre ones would be condemned, and the weight of root residue would be considered almost as much as that of the crops themselves. Pure straw crops would be grown only so long as a high condition of the soil as to organic matter would be maintained, peat moss or other organic material being bought for litter if necessary.

Success would be intimately bound up with the growth for hay or silage of bulky and especially of leguminous crops such as vetches, peas, lucerne, and clover. Much more attention than at present would be given to the possibility of laying down land on any soil with seeds for relatively long periods—six to eight years—by the judicious choice of such a mixture of deep and extensive-rooted plants as are recommended by Mr. Elliott, of Kelso, and have been found by Professor Middleton so successful on thin clays. A full supply of cinereal manure, including lime, would be regularly applied where found advantageous, but nitrogenous artificial manure would never be used except as a stimulant in early summer. It will be noticed that many of these points are consistent with the practice of the best farmer, and they may all be summed up in the motto—Take care of the land, and the crops will look after themselves.

Incidental advantages will be the suppression of weeds, easier working of the land, healthier, sounder, and more regular crops and a saving of purchased nitrogenous foods.

Such a system is more natural and fundamentally sounder than the excessive cultivation of grain with the aid of artificial nitrogenous manures, and could not only render the farmer more independent, but would enable him at any time to increase his output of grain enormously for a few years if temporary high prices made a realisation of his capital in the soil advisable.

Let us not therefore allow this hitherto flourishing soil industry of nitrogen fixation to be ruined by the dumping of foreign products of which the price would undoubtedly rise as soon as the industry was killed. Let us rather realise that our prosperity depends on its maintenance and development in the face of competition, and providing ourselves with all the knowledge which science can give us, increase its output by the judicious investment of capital in the soil.

[It will be noticed that some of the ideas of the author of this article are, especially in the practical directions, coincident with, or on the same lines as, the ideas of the late Mr. James Mason, of Eynsham Hall. Mr. Mason's experiments and views will probably, like those of Jethro Tull, be better appreciated by generations following the originator.—ED.]

GRASSES AND CLOVERS ON THE ESSEX CLAYS.

Persons who do not live there appear to regard Essex, either to farm or live in, with a certain amount of reluctance; I suppose this is partly due to the clay soil and often muddy roads. In some parts land, including buildings, can be bought at £8 to £12 per acre by purchasing the whole farm (whilst I understand improved farms in Ontario sell at £5 per acre). The population in most of the rural districts has decreased, owing mainly, no doubt, to the attraction of towns, and also to machinery replacing manual work in so many agricultural operations; in one village I know well the population used to be 600 inhabitants but is now only 300. However, I do not think I have ever seen wheat and winter beans looking so well as in the neighbourhood of Stambourne, in North Essex, this winter; here heavy crops of wheat, beans, barley, oats, kohl rabi, mangel and sainfoin are raised.

The low price of corn has, sad to relate, bowled out the large Essex farmers; the Essex farmer turns very reluctantly from corn growing. Men from Scotland, Wales, and Cornwall have taken the vacant farms, and few are now to let. Milk production for London and other towns has greatly increased in Essex. I am told the average size of the farms is about 200 acres now. During the prosperous days of corn-growing the farm labourer received but 8s. a week. Mr. Arch in justice agitated for higher wages; however, the present wage of 12s. to 13s. per week, with high pay for harvest month, is fully as much as can now reasonably be paid.

Giant sainfoin is a successful and popular crop in this district, and is more generally grown than lucerne, which yields somewhat more heavily, but is somewhat more difficult to make into hay, and sainfoin is the more valuable hay.

During summer Essex is a county that receives proportionately rather a light rainfall compared with other parts of the country.

In order for this clayey land to work well in spring as much as possible of the land is ploughed up into baulks of 6 or 8 furrows in early winter, and sometimes during the winter these baulks are re-ploughed, so that the open furrow comes where the ridge was; by this method the soil is exposed very thoroughly to the frost, which, in the language of the agricultural labourer, is worth half a dressing of dung.

If the land is drained and well treated the crops are splendid, far better than from light land of less natural fertility. It would appear there is a fair quantity of lime in the soil, as beans and the clover family thrive well and many of the clovers grow in the wild state.

The old-time farmer is rather reluctant to lay down land to grass, being used for generations to corn-growing, and because it needs more care to make good meadow or pasture than on light land.

The difficulties to contend with are in the case of wet, undrained land, having the land clean of couch, etc., having a good tilth, and having an unfavourable season follow the sowing of the seeds.

With wet, undrained land, with even the best system of cultivation and the use of the purest seeds, the result will be a dismal failure if the land is not properly drained; "bush draining" does good service for, say, seven years or more and does not cost very much; about every 14ft. to 16ft. drains are cut about 20 inches deep; "bush," such as brushing of hazel and other woods, are trodden in several inches thick, a layer of straw is placed over, then the clayey earth is filled in. Main drains are tiles of about 4 inch diameter, laid a little deeper, running into the ditches which surround nearly all the fields, and which used to be cleaned from time to time, also the hedges trimmed.

Mole draining by steam is also effectively employed, costing about £1 per acre; add to this cost of main tile drains, placed a few inches deeper than the mole drains, to carry the water into the ditches at the sides of the field.

In order to prepare a good seed bed this heavy clay should be bare followed the previous summer, and ploughed, cultivated and harrowed several times in favourable weather, at short intervals, perhaps four ploughings and workings; the land should be left ridged up to expose it to frost in winter.

In March, when quite dry, it should be harrowed down and a good tilth obtained, then thinly seeded with barley, the grass and clover being drilled or harrowed at right angles as soon as the barley is fit for rolling; if the grass and clover seeds are sown broadcast, it is advisable to sow the grasses and clovers separately, which results in mixing them better, and sowing them more regularly; the timothy grass, being a heavy seed, may be sown with the clovers.

In North Essex the climate is frequently a great obstacle; as a rule so little rain falls during the summer months that there is considerable risk of the finer grasses failing altogether from want of moisture. Bearing this difficulty in mind, one should employ grasses having long strong roots, which will penetrate far enough down for moisture; one would prescribe something like the following for a 2 or 3 years' lay:—

Cow grass clover 3lbs., giant sainfoin 5lbs., alsike 2lbs., trefoil 1lb., white Dutch clover 1lb., Italian rye grass 4lbs., perennial rye grass 8lbs., timothy 2lbs. Total, 26lbs. per acre.

For permanent pasture omit sainfoin and add: Meadow foxtail 4lbs., cocksfoot 5lbs., fescues (various) 8lbs. Total 38lbs. per acre.

The after treatment depends in a great measure on the fertility, etc., of the soil. Basic slag always answers on ordinary Essex clay and gives a better return than any other artificial manure, and would ensure a good plant of such seeds as I have prescribed.

If sown without corn, the young grass is generally mown once, then grazed till autumn, when it will be benefited by a fairly heavy dressing (15 to 20 loads per acre) of good yard manure.

Graze the following summer with cattle getting cake. For the first two years it is advisable not to graze with horses or sheep, as they are apt to eat it too close, and bite the centres out of the young plants.

The autumn after applying the dung, 8 to 10 cwts. per acre of basic

slag may advantageously be applied and graze again with cattle getting cake. After that, if the land is well drained (an essential thing), the grass will generally be well established and able to take care of itself, especially if manure of some sort is applied every third year afterwards.

Sainfoin or lucerne are frequently grown in preference to grasses and clover, as they both grow well in the district and do not cost as much to establish.

In concluding this little article, it is due to acknowledge my indebtedness for information to Rev. James H. Brooks, Vicar of Stambourne, who, besides taking deep interest in the good of his parish, takes also great interest in its agriculture and has improved many fields by drainage, laying down to grass and applying basic slag, as well as improving farm buildings, farm houses, and cottages on farms he has purchased. I am also indebted to Mr. William Solomon, who farms extensively, manures heavily, and gets splendid results.

CECIL H. HOOPER, M.R.A.C., F.S.I.

R.A.C. ATHLETIC SPORTS.

The annual sports were held on the College Cricket Ground on Wednesday and Thursday, March 28th and 29th. The weather was all that could be desired, the spell of bitter North-East wind, with which we had been favoured for the previous ten days, giving way to more spring-like conditions. Thanks to the efforts of the Hon. Secs., A. A. Osborn and C. B. Joynson, with the Sports Committee, consisting of Professor Kinch, and Messrs. Murray, Vernon, Burra, and Henniker, all the arrangements were well carried out. The Principal was president, and in addition to the Sports Committee Professors Blundell, Duncan, and Thain, and Mr. Russell Swanwick assisted as stewards. Professors West and McClellan and Mr. Haygarth acted as judges, Mr. J. A. Ross Hume as starter, and Dr. Gundry as time-keeper. The Principal and Mrs. McClellan entertained a large number of visitors and students in their usual hospitable way on Thursday afternoon, and the band of the 4th Gloucester Regiment was also in attendance. Most of the events were well contested, and although no records were broken, some satisfactory results were achieved, as the following details will show:—

100 YARDS (Heats).—First heat—Piha 1, Taylor 2. Second heat—Murray 1, Hinds 2. Third heat—Joynson 1, Vernon 2. Semi-finals—(1) Vernon 1, Joynson 2; (2) Piha 1, Hinds 2. Final—Vernon 1, Joynson 2; time, 11 secs.

LONG JUMP.—Joynson 1, 19 feet 8 inches; Hinds 2, 18 feet 7 inches.

HALF-MILE (Open).—Gater 1, Vernon 2, Osborn 3; time, 2 min. 18 secs.

THROWING THE CRICKET BALL.—Vernon 1, 87 yards 1 foot 8 inches; Hinds 2, 84 yards 2 feet 9 inches.

PUTTING THE WEIGHT.—Lyon 1, 31 feet 6 inches; Henniker 2, 28 feet 9 inches.

THREE MILE RACE.—Mathias 1, Vernon 2, Chell 3; time, 17 min. 32 $\frac{2}{5}$ secs. The winner ran strongly and well, and thoroughly deserved his victory.

QUARTER-MILE RACE.—Vernon 1, Osborn 2, Murray 3; time, 58 $\frac{2}{5}$ secs.

WALKING RACE, Two Miles (first prize presented by Mr. and Mrs. Russell Swanwick).—Casey 1; time, 20 min. 20 secs. Popple and Slater were disqualified, the latter late in the race, and no one but the winner finished.

HURDLE RACE (first prize presented by the Principal and Mrs. McClellan).—Hinds 1, Macnamara 2; time, 20 $\frac{1}{5}$ secs.

THROWING THE HAMMER.—Heathcote 1, 73 feet 3 inches; Longcroft 2, 68 feet 6 inches.

MILE RACE.—Gater 1, Mathias 2, Chell 3; time, 5 min. 13 $\frac{1}{2}$ secs. This was a good race between the first and second men, who took the command in alternation, and indeed, for more than half the distance Mathias seemed to have it well in hand. At the beginning of the last lap, however, Gater came away and won in fine style, almost as he liked, by 20 yards.

SACK RACE.—Mathias 1, Slater 2.

HIGH JUMP.—Joynson 1, 5 feet 0 $\frac{1}{2}$ inches; Heathcote 2, 4 feet 11 $\frac{1}{2}$ inches. Joynson jumped well, and Heathcote's was an excellent performance for a man of his weight.

BICYCLE EGG AND SPOON RACE.—Henniker 1, Macnamara 2.

200 YARDS HANDICAP.—Piha (5 yards) 1, Henniker (12 yards) 2, Rheingantz (3 yards) 3; time 23 $\frac{2}{5}$ secs.

HALF MILE HANDICAP.—Osborn (20 yards) 1, Donaldson (30 yards) 2; time, 2 min. 20 secs. Donaldson, the limit man, held his lead for three-quarters of the journey, when Osborn, with a long raking stride, developed a fine turn of speed, and shot to the front, winning easily by 20 yards.

TUG OF WAR.—The Out-Students' team, thanks to superior weight, got the best of matters in two successive pulls, and won, though the In-Students made an exceedingly plucky contest of it.

CONSOLATION RACE.—Burra 1, Taylor 2.

DONKEY COSTUME RACE.—For this event, which is always looked forward to as provocative of amusement, the customary "race-card" was issued. In spite of the regulation prohibiting betting on the course, a bookmaker's stand—understood to be the spoils confiscated from a welshing "penciller" who was found to be missing at the close of one of the V.W.H. Point-to-Point races at Swatnage—was set up,

with the odds offered duly chronicled. But the establishment was absolutely deserted, and if any tender hopes were entertained that the owner would turn up and claim his property and meet his obligations, they were doomed to disappointment. The front page of the "correct card" was as follows :—

THE HOAX-Y STEAKS.

Thursday, March 29th, 1906.

(Under Asscot Rules.)

Open to all married and single Students under eighteen stone. "These hacks are provided for light articles only. They must not be used for heavy luggage."

No whips, spurs, or other similar tonics may be applied. Back-pedalling brakes may be found useful at the finish, and can be carried if desired.

No betting allowed on the course, but pitch-and-toss may in some cases be unavoidable.

Motto for Riders.

"Sit further back, and get a longer ride."

After careful study of the Barometer we have been advised by the College Meteorological expert to change the name of the meeting to the SOAK-SEY STEAKS.

"Full many an Ass of purest blood, I ween,

Lives through its life-time playing a humble part,

Full many a Racer has to blush unseen,

Between the Blinkers in a Coster's cart.

Depreciate us not with idle Jokes,

We have our feelings though we are but Mokes."

TENNYSON.

The "probable starters" were set out in detail, each being honoured with a poetical effusion.

PROBABLE STARTERS.

<i>Owner.</i>	<i>Donkey.</i>	<i>Costume.</i>
Mr. MATHIAS' ...	"Tal-y-llanpendyffryn-fawr"	Welsh Woman
	"I do not ask to hold your hand, Good Lady from a gallant land. I would not wish to kiss your face, Who represent an ancient race. But one short query may I ask If I don't set too hard a task— How, oh how, good Celtic dame, How do you pronounce your name?"	
	<i>Stock Breeders' Chronicle.</i>	
Mr. DONALDSON'S ...	"Charles I."	... Oliver Cromwell
	"Though years ago they cut it off, The fact no doubt is proved; How awkward would it now seem if The 'King's Head' was removed."	
	<i>The Foresters' Song Book.</i>	
Mr. PERO'S ...	"Edna"	Belle of New York
	"Tell me, gentle lady, tell me pray, Is your donkey brown, or black, or bay, Piebald, spotted, striped, or dappled grey? For if you can but make her run away You may not win the race, but Edna May."	
	<i>The Winning Post.</i>	

Mr. CALVERT'S ... "Horse Power" ... Chauffeur

"I thought I saw a Motor Car
Coming along quite well ;
I looked again and found it was—
I cannot really tell ;
The dust obscured my vision, but
It didn't stop the smell."

Walking's Litany.

Mr. SMYTH'S ... "Irish Molly" ... Dublin Market Woman

"Molly had a little lamb, its fleece was emerald hue,
She called the creature 'Shamrock,' as any one might do ;
But changed its name to 'Whisky,'
To keep its *spirits* frisky,
In case it knew
The time was due
To make it into Irish Stew."

Life and Travels of Sir Charles.

Mr. COPE'S ... "Missing Link" ... Monkey

"I wonder if the power of sight
Were given to the mole,
Would he be frantic with delight,
Or show some self-control.
I wonder if the gift of speech
Were sent to flocks and herds,
Would they at once begin to preach,
Or use offensive words.
Still more I wonder what you'd do
If your strange donkey came in two !"

Heads and Tails.

The card finished up with the following

SPORTING NOTES.

No reliance can be placed on Professor Blundell's BERKELEY BUS. Though it takes water well enough it is no good over *timber*.

We regret to announce that Mr. Smyth's SHAMROCK was drowned on the 17th March.

We hear that Mr. Essex, M.P., does not approve of the *egg* diet theory, during training, or at any other time, even though the yolks are *yellow*. Speaking from personal experience he considers they tend to make the animal *chicken-hearted*.

Mr. Ben. Bathurst's MEMBERSHIP is being given a temporary rest, but will resume work shortly.

Mr. Dobbs' HONEYMOON starts in the Easter Handicap.

The College authorities have decided no longer to have their stock trained by Mr. Byrne, well known as special correspondent to the *Daily Mail*, and author of "Eggs and Biliousness," "Fowl Play at Billiards," "Manners for Foster-Mothers," and many other short articles of eggs-traordinary interest on byrne-ing questions of the day.

Mr. Rheingantz' FARMER'S GATE has not been exercised outside the stable until recently.

Mr. Gater's CLOSED PEEPER (by Splinter, out of Punchball), reported unwell, has recovered.

As to the race itself, it was singularly uneventful, the donkeys displaying perfect manners. There were only two in it, the steeds of Pero and Mathias, and the former won on the post. Donaldson

carried off the costume prize for a capital get up as a Japanese lady, while Mathias gave a very creditable representation of a Welshwoman.

The Jumping and Hurdle challenge cup went to Joynson, that for the Three-mile Race to Mathias, and that for the Mile Race to Gater, while Vernon carried off the Medal for the greatest number of marks.

The prizes were kindly distributed by the Hon. Mrs. Ben. Bathurst, and at the close of the ceremony Mr. Joynson conveyed the thanks of the College to Mr. and Mrs. Swanwick and the Principal and Mrs. McClellan for their gifts of prizes, and to Mrs. Bathurst for kindly consenting to give away the prizes.

Cheers were given for Mrs. Bathurst, and, at the suggestion of the Principal, cheers were added for Mr. Bathurst.

The Hon. Ben. Bathurst returned thanks for the welcome accorded to Mrs. Bathurst and himself, remarking that it gave them both great pleasure to keep up their connection with the Royal Agricultural College, of which he had the honour to be a member.

DIPLOMA EXAMINATION.

Last term, Christmas, 1905, the following students received the Diploma of Membership; Albert Sasson, Miles Ponsonby Knubley, Harry Howard Beardsley, Lawrence Brown Akers, Kenneth McDiarmid, Alan Roderick Whittington, Harold de Byrley Archer, Henry Trells Watson, John Poore, and Lambert Wilfred Alexander de Soysa.

Mr. Sasson obtained a Gold Medal, and Messrs. Knubley and Beardsley Silver Medals.

The external examiners were Mr. H. W. Adams in Agriculture, Dr. J. A. Voelcker in Agricultural Chemistry, Prof. H. Robinson in Land Surveying and Engineering, and Prof. Sir G. Brown, C.B., in Veterinary and Bacteriology.

SCHOLARSHIPS.

The first Scholarship last term was gained by Mr. W. A. Waller, and the second by Mr. Robert Henry Price: Mr. A. Major Henniker being *proxime accessit*.

OBITUARY.

We regret to record the death of Arthur Leopold Paget (R.A.C., 1885-1886), Lieutenant-Colonel 4th Batt. Gloucestershire Regiment, and Land Agent, of the firm of Paget and Rylands, Cirencester. At Stratton, Cirencester, on March 1st.

OLD STUDENTS.

An agricultural conference was held in Bombay on February 5th and following days. The President was Mr. J. W. Muir MacKenzie, M.R.A.C., who said that important beginnings had been made in the department of agricultural research and education in Western India. He pointed out that it was the late Mr. E. C. Ozanne, M.R.A.C., who gave the first effective impetus to the scientific development of agriculture in this Presidency. Ozanne established the Kirkee demonstration farm and dairy, which latter had developed into an industry, which had spread all over India. Referring to the Agricultural Colleges, the president said that by a course of study at the colleges it was not expected to make a man into a scientific and practical farmer. The colleges give an agricultural bent to the student's mind, and enable him to think correctly about agriculture and to bring to bear upon agricultural problems in India the results of information and thought. Mr. Muir MacKenzie spoke hopefully of the establishment of Egyptian cotton growing in Sind.

FOOTBALL.

This session, as is usual, the College were at a disadvantage, having lost several prominent members of last session's team. The following matches have been played :—

R.A.C. v. BERKSHIRE WANDERERS.—Played at Reading, February 7th. This match resulted in a win for the Wanderers—36 points to 6. Osborn and Vernon scored for the College, neither of which tries were converted. In this match we were playing one man short.

R.A.C. v. CHELTENHAM A.—Played at Cheltenham on February 17th, and resulted in a win for our opponents by 9 points to nil, after a well contested game. Osborn was unlucky in not scoring on one occasion.

R.A.C. v. ST. PAUL'S COLLEGE.—Played at the College on February 21st, and resulted in a win for the visitors by 19 points to nil.

R.A.C. v. GLOUCESTER OLD BOYS.—Played at the College on March 3rd. This match resulted in an easy win for the visitors by 37 points to 3 (Vernon scoring for the College).

GOLF.

A match was played on Wednesday, March 7th, against Sapperton Park Golf Club, the College losing by 3 matches to 5.

R.A.C.				SAPPERTON PARK.			
Prof. Blundell	...	..	0	J. Rawlins..	...	...	1
G. Lyon	...	...	0	E. C. Cripps	...	...	1
Prof. West...	...	...	0	E. C. Sewell	...	...	1
E. B. Haygarth	...	...	1	A. Stradling	..	...	0
M. Gandara	...	...	0	R. J. Mullings	...	...	1
J. H. Middleton	...	...	1	H. Boulton	...	...	0
W. W. Dobson	...	...	0	W. H. Cole	...	...	1
C. B. Joynson	...	...	1	V. Macnamara	...	...	0
<hr/>				<hr/>			
3				5			

During the term a Doubles Handicap Tournament was played off, and won by Prof. Blundell and V. Macnamara. The runners up were Prof. Gundry and G. Lyon.

REVIEWS.

AYNSOME AGRICULTURAL STATION : THIRD ANNUAL REPORT OF THE SEED-TESTING LABORATORY. By J. Stewart Remington, M.R.A.C.

We are pleased to see that the value of this seed-testing laboratory is gradually becoming appreciated, the number of samples examined having risen from 1,077 to 1,297 during the past year. The average germination for clover seeds, both red and white, was higher than in the previous year. This report contains figures of the commonest weed seeds found in clover and grass seeds.

ARSENIC IN BEER, HOPS AND MALT.

Owing to a somewhat sensational statement contained in the report of the Medical Officer of Health for the City of London, to the effect that the "two materials mostly likely to account for the traces of arsenic in beer are malt and hops, and in proportion as the public insist on the sole or increased use of these in the manufacture, so does the danger of arsenic increase,"—the County Analyst for Worcestershire, Mr. Cecil C. Duncan, was instructed to report on the allegations as affecting Worcestershire as a hop producing county. In a report of experiments carried out last year and bearing on the subject, Mr. Duncan found that arsenic was present in very minute quantities in several soils upon which hops were grown, probably derived from arsenic contained in the manures used, especially in superphosphate. But in hops grown in such soils in the county and which had not been sprayed no trace of arsenic could be found, the whole plant being free from arsenic. The apparatus used would show readily 1-1000th of a grain of arsenic in a lb. of hops. Also no arsenic was detected in the grain of barley grown in such soils. It was found, however, that hops, dried by the "Direct Process" with coal, or coke, or anthracite, which had not been specially selected, were liable to contain minute traces of arsenic. When the hops were dried by the "Indirect Process," in which no fumes from the furnace came into contact with the substances to be dried, but only with hot air, the resulting dried hops are *free from arsenic*. Similarly if barley malt be dried with similar precautions it will be free from arsenic. Therefore "malt and hops" beer should be a synonym for "pure" beer.

EXPERIMENTS WITH SUGAR BEET.—A short Report by G. Clarke, Staff Instructor, on some experiments conducted by the Education Committee of the Essex County Council "in order to find the yield and quality of the beet grown on typical soils, and to compare some varieties."

These experiments were undertaken in view of the revival,—owing to "the high price of sugar in 1904 and the exclusion of bounty-fed sugar from the English market,"—of the idea of manufacturing sugar from beets grown in this country. They show that in Essex, at any rate in a dry year, a fair crop of beets with a high percentage of sugar and high purity of juice can be grown if the right varieties are chosen. In these essential qualities the beets grown were fully equal to the

majority of those grown on the Continent, the average crop being over 18 tons per acre, containing just over three tons (16·6 per cent.) of sugar. The variety "Klein Wanz Leben" proved the best. The beets were grown by farmers in five different districts, in ground prepared for mangels. The cost of cultivation is variously estimated at £9 to £14 per acre, including the cost of seed, but excluding rent and rates; and to these estimates the cost of forking out the crop, which has a very deep-growing habit, contributes £2 to £5. The results of manuring with sulphate of potash were contradictory. It is suggested that the crop might make 18s. or 20s. per ton, trimmed and delivered at a factory, but no definite conclusions are drawn. Having regard to the fluctuations in the price of sugar, which is now as low as it was before the Sugar Convention, and to the fact that sugar was for years produced from cane in the face of a 50 per cent. bounty, it is to be hoped that the success, from a purely cultural point of view, of these and similar experiments, will not lead to the investment of capital by farmers in what must be, for some years at least, a pure speculation.

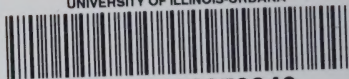
UTILISATION OF NITROGEN IN AIR BY PLANTS.—A publication of the Aberdeenshire Agricultural Research Association, consisting mainly of a Report of certain investigations made by the Director of Research, Mr. Thomas Jamieson.

The whole interest of the report centres in a claim made by Mr. Jamieson that he has "proved that plants in general absorb and utilise nitrogen from the air" chiefly by means of what he terms Albumen-generators—specialised hairs on leaves and young growing parts. Mr. Jamieson has observed that albuminous matter appears at a certain stage in the tips of these hairs, and is subsequently discharged. This does not seem in the least improbable, though for various reasons the assumption that all Mr. Jamieson's observations are correct is unwarranted, but the conclusion to which he jumps—that atmospheric nitrogen is absorbed by these hairs and converted directly into albumen—is quite unnecessary and rests on no shadow of proof. Mr. Jamieson must be aware that plants are saturated with nitrogen gas, both dissolved in the water they continually transpire, and free in their very perfect internal respiratory system. What need of further absorption? He must also see that the appearance of albumen in any part of a plant does not prove that it has been formed either *in situ*, or directly from free nitrogen. The fact is that Mr. Jamieson in his report deliberately minimises the well authenticated evidence of the fixation of nitrogen by certain micro-organisms in the soil and by the bacterioids—which he prefers to call fungi—causing the tubercles on the roots of leguminous plants, in order to have to account otherwise for the presence of combined nitrogen. Hitherto the most carefully conducted experiments have shown that plants cannot, in the absence of the above-mentioned organisms, obtain or add to the soil more combined nitrogen than was originally present in the soil. Mr. Jamieson has not attempted to show that any plant can do so. This is the obvious and only test of the correctness of his conclusions, and without it no one who has studied the subject can afford to pay attention to his claim.





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